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WHERE is room for considerable doubt whether telegraph and telephone companies are entitled to the privilege which they assume of carrying their lines over the roofs of houses without the owner's permission, even though the wires may be strung at such a height above the roof as to prevent them from coming in contact with it. The common belief in regard to the possession of real-estate is that the purchaser of any given piece of land is understood to acquire with it a pyramid of the earth's substance having his lot as a base, and terminating at the centre of the globe, as well as a further volume of air or ether, extending upward from his lot an indefinite distance into space; and as the law seems to have been well settled in the case of the London underground railway, that no one can be compelled to submit without compensation to having a tunnel carried beneath his estate, it seems only reasonable to suppose that the stringing of wires at any height above a building is equally an infringement of the rights of its owner. As it happens, a case has recently occurred, in which the question of the respective privileges of the parties under such circumstances is involved, and as the courts have been called upon to define them, the result will be interesting. In this instance, the tenant of a building in Philadelphia, over which the wires of the Bell Telephone Company were carried, against his remonstrance, at a distance of five and one-half feet above the roof, considering that his privileges as a tenant were infringed, although the wires were not attached to, or supported from, the roof, tied them up, so as to keep them out of the way. This interfered with the working of the lines, and men were sent to put them in order. These men necessarily went through the house to get to the roof, and the tenant notified the company that he would not allow the wires to be used without compensation. No response was made to this, and he finally tied up the wires again; whereupon the company brought an action against him for malicious mischief. It is quite probable that the suit will be compromised, as the telephone companies would hardly dare to run the risk of a decision adverse to them, and such a decision, in view of the circumstances, might not be unreasonable.

AMID the noise of the universal outcry against overhead telegraph wires, which bids fair to compel the use of buried cables in most of our cities, it might be worth while to inquire whether we are quite sure that the public in general will be as much benefited by the change as a few patentees and other holders of valuable monopolies relating to underground electric lines. A few days ago it was our fortune to pass through a certain street in which an underground cable was laid two or three months ago. The laying of the cable seemed to have been a difficult matter, as the street was barricaded for some days while operations were going on; and the repairs, or whatever else might have been in progress at the time of our late visit, were, as it seemed, also serious enough to call for the blockading of a large part of a very wide thoroughfare. It must have been impossible for one interested in the subject to see the barriers erected again without some gloomy forebodings as to the future of our principal streets when each shall have, not one, but a dozen electric cables buried in it. As certain telegraph officials have already explained, it is impossible to guarantee the continued insulation of wires covered with gutta-percha or paraffine, if they happen to be brought near a hot steam-pipe; and this circumstance alone, in a city like New York, where steam-heating companies and subterranean-wire corporations have equal rights in the same streets, must, independent of the shifting of cables, if all wires are put below the surface, soon lead to an interminable and exasperating succession of those interruptions to traffic which have already, through the operations of the steam-heating companies alone, driven the citizens nearly to desperation.

IF electric cables must be buried in the streets, we must make up our minds either to permit the pavements to be continually torn up to change or repair them, or to go without using them. There is now no middle ground between these two alternatives. At the best, those who use the telephone must be prepared, if their wires are removed from the house-tops, to find the efficiency of their instruments much diminished; and it may be doubted whether, after their communication with the more distant places has been cut off, and that with nearer points reduced to the faint whisper now characteristic of telephone signals through cables below ground, this important portion of the community will not be found disposed to return, if not to the present system, at least to one different from any yet proposed in this country.

THE English journals announce the death of a man, who, although hardly acknowledged as an architect by the profession, not only distinguished himself greatly in his day by the buildings which he designed and carried out, but for a time exercised a great influence upon the practice of the art. This man, it need hardly be said, was Major-General Scott, who died at Sydenham, on the sixteenth of April, at the age of sixty-one. Educated as a military engineer, General Scott was for many years instructor in surveying and astronomy at the military school at Chatham, and acted also as adviser to the Military Education Department of the War Office. On his retirement from the army in 1871 he was made Director of the public buildings in South Kensington, acting, after the death of his predecessor, Captain Fowke, as architect of the Science Schools and the Royal Albert Hall. The assiduity with which he devoted himself to these buildings, and the novelties in design and construction which he introduced in them, are well known. In the Science and Art Schools terra-cotta was used for the first time on a very extensive scale; and it is due to General Scott to say that notwithstanding what we might call a few grammatical slips in other portions, the material which he introduced was employed with a freedom and success which has hardly since been surpassed. The Albert Hall is less successful as a design than the other building, but contains a great deal that is novel and suggestive. In details of construction General Scott was as studious and inventive as in his designs. His experiments upon the various matrices used for practical purposes led him to the important discovery of selenitic mortar, in which ordinary unslaked lime, by the addition of small, regulated quantities of dissolved plaster-of-Paris, or even of sulphuric acid, is made to take a new character, acting as a strong hydraulic cement. Until very lately General Scott was actively engaged in construction, his last work being the building for the International Fisheries Exhibition.

TWO engineering works which were, when first projected, a few years ago, denounced as impracticable and useless, will probably be duplicated before long in order to enable a second set of stockholders to share in the rich profits which have rewarded or will reward those who had the courage to persist in carrying out the original scheme. The Hudson River Tunnel is not yet completed, but its importance to the carrying trade of the future has become so obvious that a second tunnel under the river has already been surveyed, and will probably be in process of execution before the first is fairly open. The second tunnel will cross the Hudson a mile or so below the first, extending from a point near the foot of Courtlandt Street to the terminus of the Pennsylvania Railroad in

Jersey City, so as to enable trains from this and the New Jersey Central Railroad to run directly through it. On the New York side of the river it is intended to continue the tunnel under the City Hall Park to Elm Street, and thence by Lafayette Place and Fourth Avenue to Thirty-third Street, where it will merge into the tunnel which already occupies the upper part of Fourth Avenue. By means of this succession of underground roadways freight trains can pass from the tracks of the Pennsylvania Railroad directly upon those of the Hudson River and New Haven roads. Instead of passing through light silt, like the present tunnel, the new one will be bored through the rock from shore to shore, in order to secure the firmest possible roadbed for the heavy freight trains which will use it. The other important second-hand scheme is one for duplicating the Suez Canal, which is now crowded with business beyond its capacity, and earns immense profits. This project seems to have been formed in England, and it is said that the necessary money for carrying it into execution can easily be obtained.

IT seems that the story told in some of the daily newspapers several months ago, that the foundation for the pedestal of the great Bartholdi statue had already been laid by the United States Government, was premature; and excavations have only just been begun on Bedloe's Island. The basis of the structure will be a mass of concrete, laid on the gravel which forms the subsoil of the island. The concrete monolith will be sixty-four feet square, and about fifteen feet thick, forming a very substantial foundation for the granite pyramid which is to rest upon it; and by a happy thought the spot chosen for it is in the centre of a small star fort, built about seventy years ago, whose ramparts and glacis will form a graceful transition between the formal outline of the pedestal and the grassy turf outside. Drawings of the statue and its supports have been received from France, and Mr. Richard M. Hunt has been entrusted with the task of designing the pedestal in conformity with the requirements of the case. Although less than half the money needed has been raised, there is little doubt that the remainder will be secured, but various considerations have determined the committee, with the engineer in charge of the work on the foundations, to defer the placing of the statue for another year. It seems that the great figure cannot be got ready for shipment for five or six months yet, so that the ceremony of inauguration could not take place before cold weather; and it is thought that under these circumstances it will be best to make sure of the solidity of the pedestal by allowing for its construction the whole period from the present time to the return of suitable weather for out-door festivities next year.

MR. CHARLES BUDDENSICK of New York, whose name was made famous some years ago by the investigation of the *Sanitary Engineer* into the character of the houses which he built and sold, seems to have been very little affected by the unpleasant publicity then given to his practices, and is still occasionally reported as coming into collision with the officers of the City Board of Health. According to the official report of the Board for the third week in April, one of the innumerable houses recently built and owned by him was found, although occupied, to have no drain; the soil-pipe discharging all the matter which passed through it into the cellar. This extraordinary sort of drainage would, in any other city than New York, seem to have been the result of some accident, but it is not too much to say that with a certain class of builders in that town such things only prove to have been accidental after they are found out by the inspector. We remember a case where a store and tenement on Broadway, on being measured for remodelling, were found never to have had any communication with the drain. The soil-pipe ended under the lowest floor, and the workmen employed in making the required changes were obliged to construct a kind of raft, on which to make their way through the sea of filth. In this case the senses of the inmates of the building, might, it would seem, have indicated the existence of some sanitary defect, but with new houses detection is more difficult. A story is told about a certain house recently completed by one of the Buddensick tribe, in which the Inspector for the Board of Health found that the regulation for foot-ventilation to the soil-pipe had not been complied with. He ordered the deficiency supplied, and received a promise of obedience. On his next visit he found the inlet-pipe apparently in position, opening in the usual manner at the edge of the sidewalk; but something aroused his suspicions, and pulling gently on the rim, it came away altogether, and proved to a short fragment of pipe, stuck in the sidewalk at the proper place, but having, of course, no connection with the plumbing.

A WRITER in *La Semaine des Constructeurs* describes a mode of protecting cellars against water from outside which may be found of considerable value. The process seems to have been first used by an engineer at Maestricht, in Holland, who, wishing to avail himself of the impermeability and adaptability of clay for such purposes, met with complete success in employing it as a thin film between two bodies of masonry. Beginning with a bed of bricks, laid flat, in two courses, slightly hollow in the middle, so as to form an inverted arch, he put over this a coating of clay about three inches thick. The clay was put in place dry, in fine powder, carefully sifted and pressed down. Over this a single course of bricks was laid dry, and the joints then filled with powdered clay, and finally a brick pavement in the form of an inverted arch, eighteen inches thick, was built over the whole. The side walls of the cellar were built double, with a space of three inches between, which was filled with dry powdered clay, put in in courses about eight inches deep, rammed down, and covered with a strip of wood to prevent mortar from falling into it. With care in execution, this device for water-proofing the cellar proved perfectly successful. This seems to be an improvement on a process much used in Boston for "boxing" cellars below the level of tide-water, by driving sheet-piling all around them, and filling the interval between this and the outside of the stone walls with a tenacious and uniform quality of clay, obtained in abundance in the neighborhood, and known as "boxing clay." The protecting mass of clay is usually a foot or more in thickness, and is put in in its natural condition, but well mixed and rammed. Of course, the bottom of the cellar cannot be protected by this means, but as the hydrostatic pressure of the exterior water is not very great, a thick bed of concrete well joined to the walls serves to resist it.

THE *Builder* gives a brief statement of the present capital of the principal English railways, which is instructive as showing the comparative poverty and immaturity of our own lines. At the end of 1882 the capital of the London and Northwestern Company amounted to four hundred and thirty-four million dollars; that of the Midland Company was three hundred and fifty millions; that of the Great Western was three hundred and forty millions, and that of the North-eastern two hundred and eighty millions. The value of the property, as represented by the capital, of twelve railway corporations was twenty-five hundred million dollars; while the number of miles of road owned by the same corporations was something over eleven thousand. This gives a capitalization of more than two hundred thousand dollars per mile of road, but it must be remembered that railway companies in England hold great numbers of hotels and other buildings as a part of their property, and it is said, even carry on a regular livery-stable business in many towns. As in this country, each of the great corporations has been made up by gradual accretion of several smaller ones, which, after a precarious existence of rivalry and competition, have consolidated into a vast monopoly.

THE mistake through which the wonderful little city of Zuñi narrowly missed being deprived of its water-supply by an error in a survey, which excluded from the boundaries of the Zuñi reservation the Nutria Springs originally granted to the tribe, has been rectified by an executive order from President Arthur, adding the tract containing the springs to the present reservation. It seems that the Indian chiefs, after the original grant, mislaid the document describing the boundaries of their property, and a miscalculation in a survey, about which they knew nothing, laid open the most valuable part of their land to be claimed by any one who happened to fancy it. Until lately, no one has cared to interfere with their possession, but a few months ago a party of gentlemen, in search of lands for cattle-breeding, discovering that a piece of property so valuable for their purpose in that arid country as one including abundant springs was open to preëmption, very naturally filed an application for it. The Zuñis being unable to produce evidence of their prior right, and the claimants, who were acting strictly within the law, being unwilling to withdraw, a serious dispute arose which the action of the President has settled in the best possible way.

SEWAGE DISPOSAL FOR ISOLATED HOUSES.

IT is now clearly and generally understood that the all-prevailing cesspool used for the disposal of household wastes is in every respect pernicious and objectionable. It would hardly be too strong a statement to say that the best cesspool is worse than the best sewer; even where water-closet matter is excluded, the condition is not much improved. Thus far the cesspool has been the only means of disposal generally available where there were no sewers.

The slowly-growing and carefully-matured experience of the past fifteen years has, however, demonstrated the success of the system of sub-surface irrigation, or the disposal of foul liquids by open-jointed drain-tiles laid near to the surface of the ground, within reach of the roots of vegetation, as not only a very great improvement on the cesspool, but as being, in fact, as nearly perfect as the conditions of the case will probably allow.

This system originated, so far as we know, with the Rev. Henry Moule, of England, the inventor of the earth-closet, who published a description of its application in 1868. He had found that the use of the earth-closet was objected to for the reason that it fails to provide for the disposal of the liquid wastes of the house, leaving it necessary that a cesspool or sewer should be resorted to for this purpose, which might as well be also used in connection with water-closets. He tried the experiment of laying an open-jointed tile-drain a few inches below the surface of the ground along the foot of a trellis covered with grape-vines. The result was a vigorous growth and an improved fruitage of the vines, and an inoffensive and innoxious disposal of the waste liquids.

A few years later, Mr. Rogers Field made use of the same system in connection with the drainage of houses at Leatherhead, supplementing the drains with a flush-tank arranged to hold back the flow until it became full, and then to discharge it with one rush into the tiles, effecting thereby a long period of intermission, during which the soil was exposed to aeration and consequent purification, avoiding the constant saturation that a steady trickle from the house-drain would produce at the beginning of the drain, and bringing its whole length into equal requisition at each periodic outflow.

In this form the apparatus was somewhat extensively used in England and elsewhere. At my own house in Newport, where about two hundred feet of absorption tiles performed their office satisfactorily for eleven years, I interposed a settling-basin of about one hundred gallons capacity, in the course of the drain leading from the flush-tank to the absorption area. This held back coarser matters and a large proportion of the grease. There was, however, always some difficulty resulting from the adhesion of grease to the outlet of the flush-tank, requiring frequent cleaning of the siphon, and, later, such a disturbance of the accumulated matters in the settling-basin as caused flocculent and greasy particles to flow forward, and in time to choke the drains. It became necessary, from time to time (three times in the eleven years) to lift the whole series of tiles, wash them and replace them.

The next improvement was to place the settling-basin between the flush-tank and the house, serving as a grease-trap, protecting the siphon of the flush-tank against the gradual accretion of grease, and leaving only a relatively clear liquid to be discharged into the pipes. This was a great improvement, and practically effected all that was necessary where only the small flow of the kitchen-sink was to be taken care of. It was found, however, when it became a question of disposing of the entire waste of a house, including water-closets, baths, etc., that the flow into the settling-basin had at times sufficient force so to disturb its deposits as to cause a considerable amount of semi-solid matter to pass over into the flush-tank, leading, in time, to the obstruction of the drains. This has been remedied by constructing in the settling-basin a division-wall at right angles to the line of flow, and built to about the height of the ordinary water-level. This wall, dividing the basin into two chambers, confines the disturbance caused by the inflow to the first chamber. The flow from this into the other chamber, being in a thin stream over the top of the wall, does not disturb the deposits, and only the liquid passes into the flush-tank.

It has also been found that, whatever precautions might be taken, it might become necessary from time to time to take up parts of the absorption drains, to cleanse them from occasional obstructions. When such removal of the tiles becomes necessary, it is of the greatest importance that they should be relaid on their exact original grade. To the end that this removal and cleansing may be performed by any laborer, and in an inexpensive manner, it is desirable that the tiles be laid on a foundation that need never be disturbed. Strips of board serve this purpose well while they last; but their decay is somewhat rapid under such conditions, so that it is best in constructing the drain to lay first a line of earthenware gutters, carefully placed and never to be disturbed, and to lay the tiles in these.

Furthermore, whatever precautions we may take to prevent flecks of greasy matter from entering the drains, small amounts of such material will inevitably be carried forward with the discharge; so that if the tiles are laid with close joints, the ends actually touching each other, the narrow spaces, which serve a good purpose at the outset, will in time become choked with deposits, causing the drain to act as a tight pipe, except at those few points where, from breaks or other inequalities at the ends of the tiles, there is an unduly large opening. When the drains are in this condition, the escaping sewage confined to these points, under the pressure of the discharge from the tank, may here and there reach the surface, which is of course objectionable. To avoid this difficulty it is now my custom to require the tile-layer to carry a piece of thick sole-leather as a gauge, laying the drains with a distance apart equal to the thickness of the leather. Here again might come another difficulty: were such open joints allowed to remain unprotected, the covering earth would work through them into the tiles and cause obstructions. The joints are therefore covered with a short earthenware cap over the top.

In order to leave the space between the tiles as effective as possible for the escape of the sewage, the gutter and the cap are both made with a radius greater than that of the outside of the tile, so as to form a true bed and an efficient cover without hugging the joint, except at the very top and bottom.

These developments of the system, simple though they are, have been slowly worked out to meet the succession of difficulties which have arisen in practice. They have now had sufficiently long application, and sufficiently extensive trial to make it prudent to assert the practical efficiency of this method.

It is, in fact, a perfect system for the disposal of liquid household wastes, practically and theoretically, with a single limitation, viz.: it still involves the retention of a cesspool of very limited size. It is impracticable to allow the discharge of kitchen and water-closet matter, including paper, to flow directly into the flush-tank; it would soon obstruct the siphon, and so much of it as passed on into the drains would soon obstruct these. It is imperative that such matters should be withheld until by maceration, or by decomposition they will pass on in solution, or in suspension in the liquid flow. In so far as decomposition is necessary, the settling-basin is in a less degree subject to the theoretical objections that are made to the cesspool. It is, however, to be considered that this settling-basin, which is perfectly tight as to its walls, is so small that the volume of water passing through it takes up the products of decomposition, and carries them on to the drains before they assume a condition at all comparable to that of the permanent cesspool. It is found, practically, that the arrangement is inoffensive and safe.

The line of pipe (usually four-inch vitrified pipe) leading from the flush-tank to the absorption field, be it far or near, should have its joints tightly cemented. Its fall may be, during the early part of its course, as great as the lay of the land requires, but as it approaches the absorption tiles it should be reduced to 4 inches per 100 feet. Its joints should be tightly cemented until its depth becomes less than eighteen inches from the surface. It should have branch pieces for the connection of the absorption drains delivering from the *bottom* of the main. The absorption drains, of which the total length should be about equal to the number of gallons discharged at each operation of the flush-tank, — more in heavy soils and less in light soils, — should be laid in gutter tiles, of which the channel should be about ten inches below the finished surface of the ground. The system, carried out as here described, will, I am confident, be found much the most satisfactory that can now be adopted for the disposal of the liquid wastes of country houses, and even of village houses, having a small amount of available land; for example, the absorption ground may, without annoyance, be within 20 feet of the house (as my own was). For a family of six or seven persons, with an ordinarily light soil, 300 feet of absorption drain will be sufficient. As the tiles may be laid in parallel lines not more than 4 feet apart, there will be required only 1,200 square feet of ground. Small houses, using little water, may be served with a much smaller area.

This system of disposal by absorption drains has been successfully used by a number of architects and engineers, and its application at Lenox, Mass., for the disposal of the entire sewage of the village since 1876, at Sherborn, Mass., for the disposal of the wastes of the Women's Prison since 1879, and at the Bryn Mawr Hotel, of the Pennsylvania Railroad Company, for the sewage of that extensive establishment since 1881, are practical demonstrations of the success of the method above described.

It is now so perfected in its details that it may safely be adopted for common use.

GEORGE E. WARING, JR.

SPRING EXHIBITIONS IN NEW YORK. — II.

TURNING from the portraits to the other figure paintings at the American Artists' Exhibition we find them, I think, more important than usual. Especially in the number of small *genre* subjects is there an increase over past years — doubtless owing to the reasons which I have already pointed out as discouraging contributors from sending ambitious canvases. Mr. Fuller's figure called "Nydia" is, I find, a disappointment to many of his admirers, seeming but a weaker repetition of the aim and sentiment of his famous "Winifred Dysart," and his last year's contributions. Those

who think a title an important and integral part of a picture must certainly be disappointed, for there is no realization, no suggestion even, of Bulwer's blind girl in this dainty little maiden, and the faint Pompeiian indications in the background have small connection with the principal figure. Yet the picture seems to most observers, I am sure, a very lovely work. It is a proof that Mr. Fuller's is the sort of talent which can only be hindered and never helped by the choice of a literary subject, or the attempt to do illustrative work of any kind. He is a dreamer, with delicate visions of his own, not a thinker who can materialize the creations of another. Looked at apart from the promise of its name — as we can well afford to look at any picture which is pictorially good — this so-called "Nydia" is very charming — less strong in character, less individual, less definite than some of her predecessors, and therefore, I think, less valuable and a less complete exhibition of Mr. Fuller's power, but charming in color, refined and graceful in idea, and full of a sort of dainty, juvenile, intangible charm which art can very rarely fix on canvas. It is curious to see how thoroughly American in type she is, in spite of Mr. Fuller's intended choice of so different a theme. The etherealized, yet unmistakable American accent of all his work is a quality, I think, that has not been generally enough acknowledged. To me it is one of the most delightful and most valuable factors in his art.

The highest vote of the committee on receptions, and therefore the chief place of honor, were given to Mr. Dewing's "Prelude" — another work, it seems to me, which would have been better with another title, or without one altogether. It is a lovely picture in its way — which is rather the way of decorative than of strictly representative work — and seems to have gained Mr. Dewing the wide popularity which was not secured by his poetic and original picture called "Morning" which was shown at the Academy three or four years ago, and excited so much discussion at the moment. Yet to me that had certain good qualities which the new work is without, superior though this is in very many ways. There was a sort of severe dignity of feeling, of originality of mood, about the "Morning," which one does not find in the "Prelude." The gain is in the way of sensuous beauty — beauty of type, of handling, and especially of color — and here it is very great. The composition shows two girls in classic draperies, sitting on low stools with their harps beside them, and relieved against a background of trellised roses. In idea and sentiment it is closely akin, perhaps, to certain English pictures — for example, to those of Mr. Albert Moore, but I have seen very few English pictures of any kind that were so well painted. It is a delicate sort of French *technique* applied to the most delicate phase of English fancy. The faces are more lovely and less morbid than in English work, and the color more refined and subtile. The color, indeed, in its own way, could hardly be surpassed — as a soft yet glowing decorative harmony of soft pinks and yellows. One dress is dull pink, the other dull yellow of a peculiar shade, and the background an almost unbroken mass of wall of pale-hued roses — arranged, as I have hinted, in a decorative and not a natural growth, and veiled in one place by the faint smoke rising from a censer. The manipulation, both of the faces and the accessories, is extremely good, well worked out, but very fresh and free, and the harmony between execution and idea is unusually perfect. Mr. Dewing is to be congratulated on the success he has made, and the public upon the fact that it has at last awakened to his talents. Here is a brush which some one, ambitious of fine and delicate mural decoration in his home, might employ to great advantage. When we see such work as this, and remember how much of our household decoration is still imported — often in shapes which, while pictorially good, are not *decorative* in the least — we feel more strongly than ever that the future of American art depends to-day more upon the temper and the insight of its patrons than upon the endowments of its votaries. Mr. Lathrop's design for a frieze for a Boston theatre is, however, not very encouraging. It shows a long line of very conventional little elves, too lusty in form for grace, too coppery in color for beauty. There is good work in it, but not a particle of the two factors which are so essential in decoration — freshness of fancy and charm of color.

Mr. Ulrich, a young student recently home from Munich, shows work which is quite antipodal to that which is usually thought characteristic of the Bavarian school. Most of us forget that there is, to-day, in Munich, a band of *genre* painters whose work is as carefully realistic as that of some of their brethren is bold and synthetic. Mr. Ulrich has studied with Leibl, though he shows no trace of this great painter's influence save in his devotion to matters of fact. His contribution is a small canvas called the "Carpenter," showing the artisan at work by his bench near an open window. It is a most remarkable little picture, not so much in its attention to detail, its accurate drawing, its clever rendering of textures and of character, as in the breadth and artistic harmony and feeling which have been preserved in spite of all the detail and the care. It is very conscientious work, yet we feel as though we degraded it by calling it so. A better word would be *loving* — for the most fervid painter of his own imaginings could not show more delight in his work than does Mr. Ulrich in his. And thus is enforced the useful lesson that not even the realistic delineation of a prosaic theme need be prosaic in its result, if only the painter has had feeling to start with, and the power of giving pictorial as well as photographic value to his result.

Mr. Brush, who promised such great things with his large picture of "Miggles" some years ago, but has not been often seen since that day, sends now two pictures which are generally unpopular, but are yet, it seems to me, of the greatest interest. One is of medium size, and shows the figure of an Indian on horseback. This is simply photographic work. The subject is deliberately and stiffly posed, and the landscape surroundings are not treated with any feeling or any skill of hand; but the drawing of man and horse is so good, the character of the head is so accurately given, and the effect of strong light is so truthfully rendered, that we are compelled to the decision that if it is not a fine picture it has yet many elements of strength, and many which may result in great artistic force at a future day. Mr. Brush's other canvas is much more interesting, however, and is a most curious little work. It shows a steep, snowy mountain-side, with a well-rendered sunset sky off to the spectator's left. Far up the mountain are the figures of several Indians and horses, and in the foreground a brave, mounted on the roughest of mustangs, who is leaping a chasm in the snow, while he brandishes a scalp above his head. Add the facts that the man is in war-paint of a bright mustard-yellow, and that the horse is rather sharply foreshortened, and it will be seen that the picture is eccentric, if nothing more. But it is a good deal more. It is nice in color, in spite of its oddity, good in the delicate way the distance of the snow-clad slope has been rendered, with scarcely a gradation of tone, and in drawing perhaps the most wonderful bit of work in the room. This is a picture which, in defiance of Rembrandt's dictum, one must "smell" if one would rightly see. It needs closer examination than most visitors, repelled by its oddity, seem to have bestowed, to reveal the really marvellous drawing of the thrown-back head, so perfect in form, so vivid in expression, in spite of its small size and difficult position. The rest of the figure, in its violent attitude, and the clumsy horse stretched for his wild leap, are equally well drawn. A third contribution from the same hand is a small sketch of a broad field of snow, very well rendered, which is only broken by a couple of Indian wigwams.

Mr. Dannat's "After the Mass," from the last Paris *Salon*, is a strongly, rapidly painted work, with a well arranged group of Spanish peasants in a café, the heads and attitudes being alike good in character. The picture suffers a little in one's estimation because Mr. Dannat shows very plainly that he is a pupil of Munkácsy's, and that he is not his equal. This last were too much to expect even from so clever a young painter; and it were also a little too much, perhaps, to expect that *any* young painter immediately under Munkácsy's influence could avoid showing signs of it in his work. But so clever is this one that we may believe the present is only a passing phase, and that, his lessons over, he will stand on his own feet and see with his own eyes. I may add in justice that there were few *genre* pictures of any kind at the *Salon* last summer which, with all criticisms made, were better than this.

Mr. Birge Harrison sends a figure of a girl after her "First Communion," picking flowers in a sunny field in her white dress and veil. It is not a beautiful work, but very truthful in its effects of light, with the difficult contrast of white and bright green well managed, and the character of the head well studied. Is it flippant to suggest that in view of the subject and of the density of the average human mind, it would have been well if Mr. Harrison, when turning an old frame to new uses, had obliterated the still legible title "*Un Rendezvous*" from the tablet at the bottom? The same artist also sends a good little interior, and Mr. Tracy, a young painter who has lately made himself a reputation by his portraits of dogs, a very nice interior where the action of the figures — a man and a dog — is well conceived. Mr. Carr sends a good study of a girl reading in an orchard; and Mr. Faxon a charming little picture of a nude yellow-haired child on the sea-shore, called "A Young Mariner." The type is northern, but the landscape and the coloring seem suggestive of Capri. Mr. Walter Gay sends a picture — not new — called the "Fencing Lesson," which has many bits of very good painting in it, but is rather spotty and wanting in harmony as a whole. Mr. Blashfield's "Minute-Men" was a good idea, and is well composed, but carried out in lifeless fashion, and with small success in the way of textures. Mr. Benoni Irwin's portrait group of chess-players is by no means up to his usual level. Mr. C. S. Reinhart, so long known as a clever illustrator (perhaps the best we have, — with Mr. Abbey), is turning his attention to painting, and sends a clever bit of realism in the shape of two old women, very ugly and very dirty, but very characteristic, playing cards in the chimney-corner. Mr. Trego, a young Philadelphian, and scholar of Mr. Eakins's, sends a picture called "Battery of Light Artillery," which was purchased last autumn by the Philadelphia Academy of Fine Arts. It is a very good thing, especially when one remembers the youth of the artist, still a pupil when it was completed. It is original in manner, in spite of the strong teacher he has had; well-composed and harmonious, though very neutral in color. The men and horses of the train, pulling through the mud under a heavy rain, are capably drawn, and full of action; and the atmosphere is air, and not gray paint, in spite of an unluminous quality; but in color and light the picture would probably have shown to greater advantage had it been framed in gold instead of in dull-gray metal. Mr. Chase's "Studio Interior" is not so perfect as some he has produced—not so fine in color, I think, nor so dexterously truthful in its rendering of textures. Mr. Freer's charming little nude study called "*Le Repos*" should not be omitted, but is it not almost time for our painters to give English titles to their works — now when it is fashionable for even caterers to print their bills of fare in English?

In still-life pictures the collection is not rich, but there are one or two of exquisite quality — such as Mr. Bunce's "Red Mullet," Mr. La Farge's "Fish," and Mr. Alden Weir's pale-hued, delicately yet strongly painted, and most refined and sparkling little group of flowers

and rare bric-à-brac. Work of this sort from Mr. Weir's hand shows all the aristocratic elegance of temper of the eighteenth-century painters, with more than their strength of hand; and it proves him a true colorist, though loving chiefly pale and evanescent tones.

In landscape there is much good work, and two canvases that are really remarkable. These are Mr. Donoho's "Marcellerie" which stood among the best of its kin at the last *Salon*, and Mr. Chase's view of the Hackensack River. The former is one of the rare instances when a painter has not put much sentiment into a landscape, has made it simply realistic, and yet charming and valuable as art. It is a large view of a beech wood, with no sky visible above the tall, white, sparsely-planted tree-trunks, the great mossy rocks, and the pale green of the foliage. The harmony of tone produced by these notes and the dead leaves with which the ground is covered is very charming; but the great virtue of the picture is its truthful, fresh, out-door flavor. It is not landscape art after the fashion of the elder French school, with its preponderance of sentiment and personal feelings. It is like a glimpse out of a window — as near the actual thing as art can manage, yet thoroughly artistic in effect. Mr. Chase's picture has also this out-door quality to perfection, but with more of sentiment, I think. It is a broad view of river and meadow, with stunted trees on the bank and a town in the far distance — a view that, unlike Mr. Donoho's, was prosaic in nature, and gains all its artistic interest from the way it has been rendered — with such happy choice in composition and such fine translation of the life and depth of the atmosphere. As a study of tone it is wonderfully perfect, yet this has not been an end, but a means. The flow of the water is beautifully given, and the whole landscape one of the freshest and most sincere, one of the most subtilely truthful, and one of the most dignified and serene things of the sort we have yet seen produced on this side of the water. It is interesting to note that it was entirely painted out of doors, and that its harmony in tone was learned from nature, and not elaborated according to some studio recipe. Mr. Ryder's two little works do not seem to me either so poetic or so original as his best, but they have a certain luminosity which is very charming, and, like all his works, they prove him an artist who paints for himself, and not for public applause. Mr. Hopkinson Smith sends a clever and charming, if shallow water-color, called "A Rainy Day;" Mr. Picknell a marine and a landscape which are below his former level — hard and metallic in color, and dry and painty in handling. Mr. Pierce's "Forest at Fontainebleau" is much better — good in every way, indeed; one of the three or four most satisfactory landscapes in the room. I have quite forgotten, however, Mr. Twachtman, whose work, less conspicuous because of its small size, must rank with the very best. He sends three pictures this year, one of them among the finest he has ever done — a small landscape, numbered 129, with water and thick foliage, and red roofs in the distance. As usual, it is very broad in treatment and low in tone. Some observers, I find, cannot understand what there is in it to make it seem to others one of the very best things of the year. But this is, I think, its individuality, its poetry of sentiment, its harmony of color and tone, and the way in which, unlike such work as Mr. Donoho's, it suggests far more than it describes. Mr. Allen, Mr. Bunce, Mr. Foxcroft Cole, Mr. Dewey, Mr. Gifford, Mr. Senat, Mr. Smillie, Mr. H. P. Smith, Mr. Shurtleff and Mr. Whittredge, send work of their average quality — and the names of some of these may show that the Society is certainly to-day wide enough in its sympathies to satisfy all sorts and conditions of men. Mr. Blum's little study of a Venetian street has all his old brilliancy, with more of definition; Mr. Kenyon Cox sends a clever little scene, which, again, it is like looking out of a window to gaze upon; Mr. Cranford, a new name, a nice study of a field with scrub-pines; Mr. Walter Palmer a good picture called "Noon," with the yellow grain and strongly accented sky he has sometimes given us before; and Mr. Murphy a simple out-door study of an old farm-house, more truthful, less fantastic than his former essays, but quite as original. And then I must come to an end with a picture by Mr. Inness, which is as worthy of all honor as the two with which I began my list of landscapes, but which attracts less immediate notice because we have so long known his power and expected its revelations. This is not one of his finest works, but like everything he does, is full of the very breath of nature and of personal sentiment as well. It is a simple view of a New Jersey field with a footbridge over a ditch in front, and an old man crossing it, and in the distance a railway train. Verily, art is a magician in such hands as this — not altering nature in any perceptible fashion, yet giving her a beauty and an interest that are not her own.

In sculpture there are but two things to be noted — Mr. Ezekiel's large bust of Liszt, good but rather commonplace; and Mr. Warner's bronze head of a young girl, very fine in character, and very subtile and perfect in its modelling.

On the whole, as I began by saying, the collection is a very good one — with some quite remarkable pictures, and a pleasing efficiency of accomplishment among the rank and file. Fortunately it is to go to Boston as a whole at the end of the New York Exhibition.

M. G. VAN RENSSELAER.

A REMINDER OF ANTE-BELLUM CUSTOMS. — The first colored carpenter ever seen working in Germantown is at present engaged on the alterations being made to the Opera-House by Tourison Bros., contractors. — *Philadelphia Press.*

A GRAVE ARCHITECTURAL GRIEVANCE.

ARCHITECTS, like the rest of the world, have to live; and, generally speaking, they have to live by hard work. We may add that they belong to a class of professions in which it is most important that money remuneration should come in a friendly, not an unfriendly way. The lawyer, for instance, is accustomed to be paid with groans and even execrations; the doctor knows that his fee is many a time put into its little envelope with a heavy sigh; but the architect ought always to feel that his shilling in the pound is considered to have been profitably bestowed, and that it truly represents the difference between a well-organized structure, the pride of its owner, and a mere pile of materials without form and void. In this view of the case those of our readers who have studied the anomalies of human nature may not be so much surprised as could be wished when we state the fact, that, if it pleases a client to be very shabby, the best of architects may find almost more difficulty in getting paid his due than the payment is worth. Nay, we have heard it declared that no client who is in himself sufficiently inaccessible to feelings of honor need ever pay his architect a penny-piece, provided he knows "how not to do it."

In plain language, the agency of an architect is, to the mind of an uninitiated person, so subtle in its nature, and, in the eye of an initiated person on mischief bent, so involved in intricate responsibilities, that there is no end to the repudiations, accusations, counter-claims, and miscellaneous artifices of attack and defence, which a fraudulent customer may be advised to rely upon, as means whereby to resist a just demand for architectural services: indeed, we may almost say there is hardly any restraint imposed upon the amount of exaggeration which it may be deemed expedient to indulge in; and, this being so, we need scarcely to go on to say that, when an unfortunate architect finds himself left to the tender mercies of litigation by a client who is avowedly merciless, his troubles are just as many and as great as his adversaries choose to make them, including not merely the loss of money and credit fairly earned, but the sacrifice of other cash and other character to any extent that accident may determine.

But this is not what we refer to under the title of "A grave architectural grievance;" it is vexatious enough in itself, but there is something still more vexatious which arises out of it. Our dishonest customer cannot play his game without allies, and it is indispensably necessary that he should be able to procure the aid of some other architect — probably of three or four other architects — who will show him or his solicitor (for a consideration) "the way not to do it" above referred to. Now, dog does not eat dog. Lawyers themselves are very chary of assailing each other. Medical men, with all their disagreements of doctrine, hang together honorably in personal matters. Even rival shopkeepers in back streets know the limits of decent rivalry. How, then, shall any one proceed who has to induce an architect to betray his brother?

The process adopted is always the same, and it is based upon a very peculiar characteristic of the architectural profession which we must explain. It is well known that architects have to do their work sometimes in the form of what is called *reports*. These reports are somewhat of the nature of counsel's opinions. A statement of facts, either in writing or not, is laid before an architect of presumed experience for his advice. A survey or inspection of the subject of dispute may be involved, as matter of course. Documents also are perhaps formally submitted. The architect thereupon considers the case, as he generally says, "carefully," and delivers an opinion upon it in the form of a "report," which is engrossed on foolscap, sometimes on "brief," in the elegant but severe handwriting of Chancery Lane, and with wide margins, all very stately and impressive, and wearing the aspect of a thing that is worth a handsome fee. The subject may be a builder's extras, the value of an acre of house property, the compensation claim of a greengrocer, a hundred and fifty competitive designs for a church or a town-hall, the inconography of a cathedral, the smell of a drain, the quality of a brick wall, the cause of a crack in it, and so on, not excluding a brother architect's charges or a brother architect's mode of transacting his business. Accordingly, when our shabby customer, or his solicitor, requires the aid of an architect, or of three or four architects, to bolster up his case, the trick is to request the favor of a report upon a certain statement, or misstatement, of facts. That is to say, he does not rush into the first architect's office he comes to and claim the protection of the just; neither does he send a brief to some well-known professional authority and retain him to be his advocate in the witness-box; the solicitor blandly intimates that he has a slight architectural misunderstanding on hand, respecting which he would be glad to have an opinion, and he therefore begs to be favored with a

call at earliest convenience. The whole tone of the application is as innocent as the purchase of sixpennyworth of sweets, and it is received in the same business-like way in which an order is taken for a new coat.

Thus it is that when an architect — a full member, let us suppose, of the Institute — finds a mischievous case against him taken up by a colleague with whom he has been accustomed to consider himself on the best of terms, the explanation is always very much the same: "I have no ill-will towards you, my dear fellow, far from it. I am very sorry to be against you, I would much rather be on your side; but a certain statement of facts is laid before me for my report, and — there you are! I know nothing of the rights and wrongs of the quarrel, and don't want to know. I have given my opinion upon what is a supposititious case, so far as I am concerned, and I leave it entirely to the parties to prove or disprove the facts; that is their business, not mine." Perhaps the victim of this insidious formalism may ask whether the witness will kindly consent to hear the other side; if so, the answer is equally glib: "My dear fellow, I am not the judge. I could not dare to interfere between you except as a regularly-appointed arbitrator; if I can do anything for you in *that* line I shall be most happy. In the meantime, as I have told you before, I have been asked for a report; whether that report is worth anything or nothing I really do not know; all I know is that I am subpœnaed, and—here I am!" If "my dear fellow" should then so far forget himself as to ask whether he might be permitted to see the report which is now so interesting to him, he may possibly be told that he certainly may if Mr. Solicitor has no objection; but whether Mr. Solicitor has ever been known to have no objection we are not able to say. At all events, the unfortunate litigant in due course of time sees his amiable friend in the witness-box; and inasmuch as every person who finds himself in the witness-box by virtue of a consideration of so many guineas to be paid—the disposition to pay being in some degree dependent upon the value of the evidence given—is laudably loyal to his retainer, and so far loyal also to *amour propre* that no man likes to be on the losing side if he can help it, we need scarcely say that the "report" is soon discovered to be more or less damaging, and generally more rather than less than might have been expected. What makes the matter worse is that the witness will offer to shake hands, after the battle is over, and, while pocketing his guineas at the expense of his defeated "dear fellow," will perhaps jovially rally that dejected combatant upon some want of generalship whereby the weak points of his evidence were not brought out as they ought to have been in cross-examination.

Now, all this is very painful to narrate as unexaggerated fact. Whether it may be the case that the solicitor in the first instance entraps the witness into the delivery of a report almost to dictation (as is sometimes alleged afterwards in shame); or that the architect of a certain class is in the habit of regarding a lawyer with so much awe that he is helpless in his hands; or that the temptation of a few guineas cannot be resisted; or that the titillation of the sense of self-importance is chiefly the motive impulse; or that all these influences alike, together with a *soupçon* of that enjoyment which human nature is said to derive from the misfortune of one's friends, generally combine to make a weak man do an unbrotherly act; certain it is that in perhaps no other profession in England would such unbrotherly behavior be possible, and almost still more certain that in no great guild like the Royal Institute of British Architects would it be tolerated. We may remark that even amongst architects themselves it is known by the ugly name of *Cannibalism*.

If we be asked to make a definite proposal upon the subject, we are prepared to submit that in no case of a *personal* nature ought any member of the Institute to report adversely upon any matter of a colleague's business until after hearing his explanations. If lawyers of the less scrupulous sort should object to this on some technical ground of their own, so much the worse for their law; upon the practical ground of honest fair play between brethren it seems to us that no one could possibly object to it. We have purposely avoided setting forth the particular artifices of assault which a litigating architect has so much to fear; we have contented ourselves with stating that they cannot be put in force with any effect without treacherous aid from within the pale; our further proposition simply is that the authorities of the pale are responsible for the permission of the treachery, or where is their authority? — *The Architect.*

The Longest and Highest Bridges of the World. — The longest viaduct in the world built of stone is that which connects Venice with the mainland. Its length is 3,598 mètres, or about two miles and a quarter. The longest iron bridges in the world are the following: — Parkersburg Bridge, 2,147 metres, or one mile and a third; St. Louis Bridge over the Missouri, 1,993 metres, or about a mile and a quarter; the bridge over the Ohio at Louisville, 1,615 metres, or about a mile; East River Bridge, New York; Delaware Bridge, Philadelphia, and the Victoria Bridge at Montreal, all these about fifteen hundred metres; the Volga Bridge at Sysran, 1,485 metres; and the Moerdyk Bridge in Holland, 1,479 metres; the five latter all being rather under a mile. The loftiest bridge is in France. It is the Garabit iron bridge in the department of Cantal, but will not be ready for opening till next year. It stands at such a height that the Vendôme Column on the top of the Cathedral of Notre Dame could stand under it, its height above the valley being 124 metres, or 406 feet. This is 72 feet higher than the Kinzua Viaduct in America. — *The Builder.*

WATER-CLOSETS. — XI.

Findon's Pan-Closet. — In 1836, James Findon, an Englishman, invented a combination of levers and arms for opening a pan-closet. The pan is held in position by a long, weighted lever. A rod, which was connected with the lever near the weight was also joined to a short lever that was attached to the pan. These arms and levers were so connected as to revolve freely for a certain distance on their joints, while the short arm or lever was connected rigidly with the pan. The spindle formed a fulcrum on which the pan would be balanced by the lever.

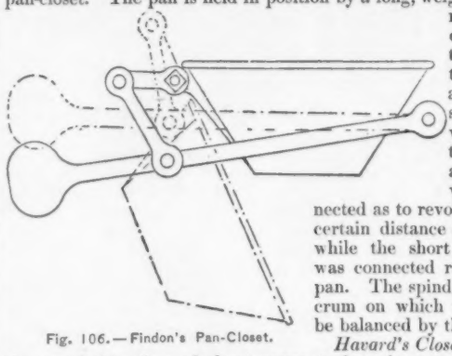

Fig. 106. — Findon's Pan-Closet.

Havard's Closet. — In France the use of this class of closet seems to have been general. Among other French closets I note one invented in 1840 by Havard. This closet received a medal at the Universal Exposition held in Paris in 1855. In this closet motion is imparted to the pan by means of a rack and mutilated pinion or toothed quadrant. The axis of one of the quadrants is the spindle on which the pan turns. Any pressure on the seat would cause the rack to partially revolve the quadrant that was connected with the pan. In this manner the pan would be opened whenever there was pressure on the seat. This closet was intended for use in public places, and Liger tells us that in 1875 it was still used in public places in Paris.

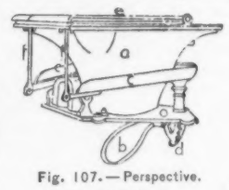

Fig. 107. — Perspective.

Havard's Closet.

Fig. 108.

Section showing working parts.

a, Bowl. *b*, Pan. *c*, Levers connected with rack. *d*, Toothed quadrant. *f*, Connecting-rods. *e*, Foot-rest.

Guinier's Pan-Closet. — Guinier, a manufacturer of plumbers' supplies in Paris, in 1840 invented a closet which I illustrate as an example of a large receiver, and a complicated arrangement for accomplishing a simple movement. I must refer to the illustration to explain the manner of opening the pan. The pull-rod, levers, arms, connecting-rods, and a large, slotted shoe-shaped arrangement are all concealed in the receiver. The pull-rod passes through a stuffing-box. It will be readily seen that this machinery could not be repaired without taking the closet to pieces, and also that it would be liable to fail in a short time. Any arrangement of this kind would afford excellent opportunity for the accumulation of filth on the different pieces of machinery. There seems to be no effort made in any of the French closets to ventilate the receiver.

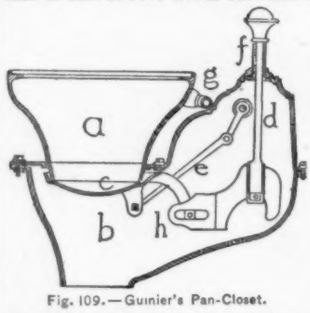

Fig. 109. — Guinier's Pan-Closet.

a, Bowl. *b*, Receiver. *c*, Pan. *d*, Pull-rod. *e*, Connecting-rods. *f*, Stuffing-box. *g*, Supply-pipe. *h*, Slotted-shoe.

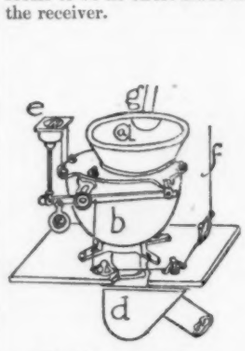

Fig. 110. — Perspective.

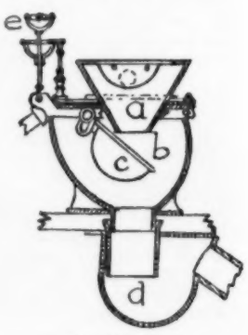

Fig. 111. — Section.

Common English Pan-Closet.

a, Bowl. *b*, Receiver. *c*, Pan. *d*, D-Trap. *e*, Hand-pull. *f*, Wires and bell-crank connecting with cistern. *g*, Supply-pipe.

Common English Pan-Closet. — Baldwin Latham[1] describes and illustrates as types of pan-closets which had been in common use, and

[1] *Sanitary Engineering.* Sewerage, London: 1873.

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COTTON EXCHANGE

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The Ladies' Study.

Jacob Sleeper Hall.
Boston University.

The Young Men's Study.

Heliotype Printing Co. Boston.

BOSTON UNIVERSITY

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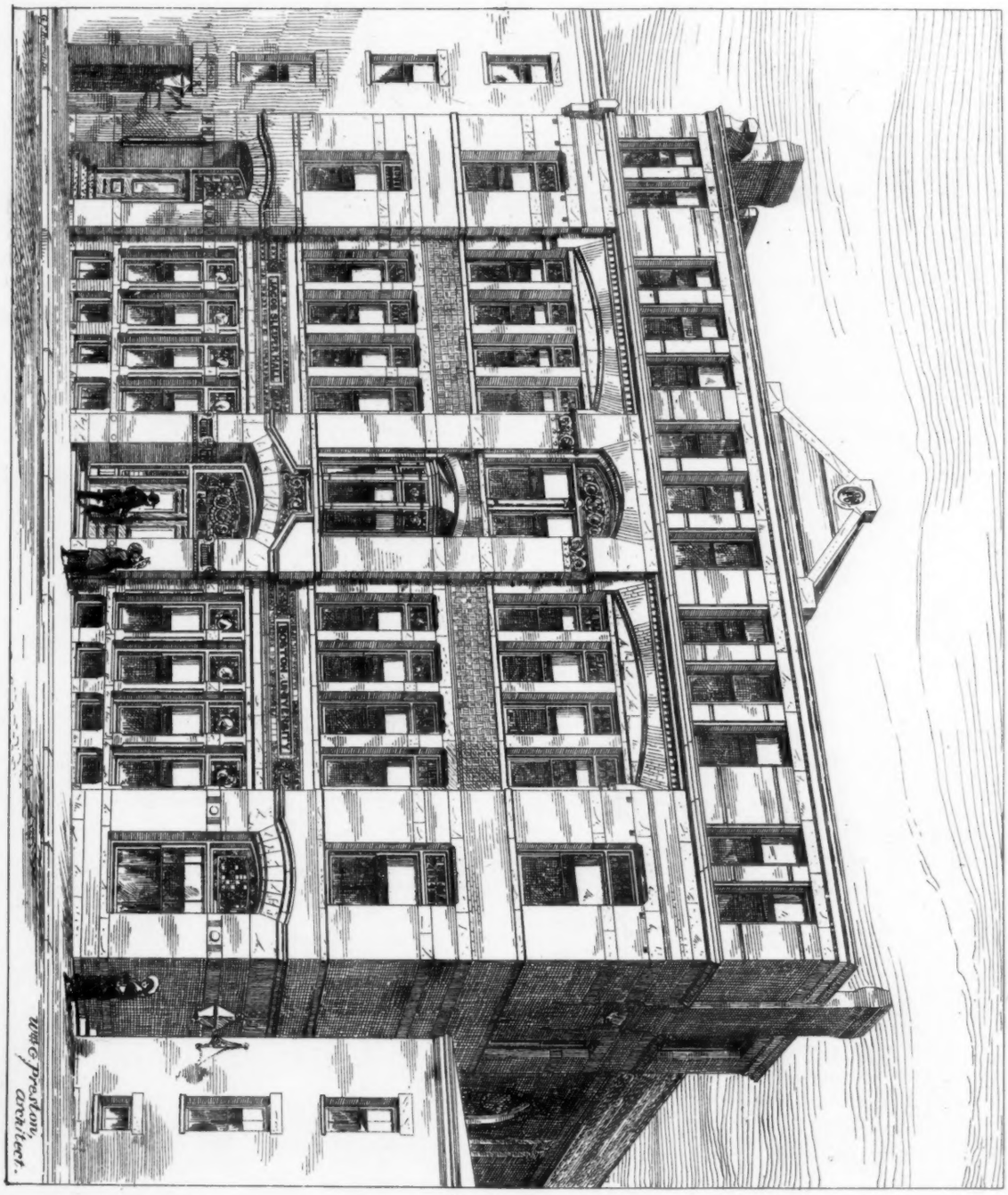


Heliotype Printing Co. 211 Tremont St. Boston.

were still used in England in 1873, the closet of which the following is a description: —

In this closet are shown some of the worst features of the pan-closet. The bowl is conical in shape, fitting into a hole in the top of the receiver. The bowl is held in position by a projecting rim, moulded around it about half-way between the top and bottom; between this rim and the top of the receiver a layer of putty is usually placed. I have never seen a joint formed in this manner between the bowl and the receiver in which the joint was perfect unless it had just been made. The least pressure against the bowl or receiver, a jarring of the floor or supply-pipe, may cause the joint to open. The putty is generally full of cracks, the cracks containing putrid urine and other foul matter. It can be easily seen that all foul gases generated in the receiver can come directly into the room when this joint is imperfect. The pan is moved in the usual manner by a spindle that has a slotted crank on one end connected with the hand-pull by a weighted lever. In the perspective sketch the mode of connecting the hand-pull with the cistern or tank by means of bell-cranks and wires is clearly shown. The usual receiver is shown in connection with a D-trap, both of which act as receptacles for the excrementitious matter passing through them. In these receptacles the waste matter lodges, remains, decays, and generates gases, and most probably liberates germs far more deleterious than would usually come from a well-ventilated sewer or drain.

The closets described in the following pages are manufactured at the present day by prominent manufacturers of plumbers' supplies. Patents, when claimed on them, are usually for some novelty in the position or form of the supply-valve, or the weighted lever. As these parts might be with equal facility, with some exception, attached to a valve-closet, they cannot be put down as distinct features in the class which is under discussion.

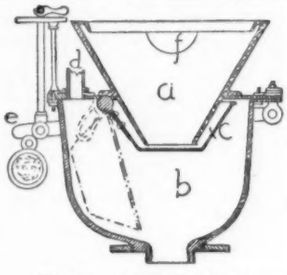


Fig. 112. — Hellyer's Pan-Closet.

a, Bowl. *b*, Receiver. *c*, Pan. *d*, Vent. *e*, Weighted Lever. *f*, Fan.

Hellyer's Pan-Closet. — Although Hellyer[1] condemns the pan-closet in very strong terms in both his works on plumbing, he finds it a commercial necessity to manufacture them to supply the demand. This closet is similar to the one described above, except the vent-pipe, which is inserted into the top of the receiver. In this illustration is shown the usual manner of setting the bowl on the receiver, and the way in which it dips into the pan and forms a water-seal. This closet has a combination of the old-fashioned fan with a small flushing-rim for spreading the water around the bowl. The vent-pipe is screwed into the top of the receiver back of the pan, where most of the filth accumulates.

Doulton Pan-Closet. — The Doulton Company manufacture a pan-closet that has an ample vent-pipe which enters the receiver on the side near the bottom. This closet has a stoneware container, of which the manufacturer says: "and thereby is obviated the hitherto great objection to this closet, from the container, when of iron, becoming encrusted with soil and emitting impure gases." This container has a white glaze inside.

Cazaubon's Closet. — F. Liger illustrates a closet invented by Cazaubon. In this closet the pan is moved by a short arm or lever, which moves up and down on a fixed axis. The end of the lever, where it comes in contact with the pan, has a semi-spherical button. The pan is hinged, and when it opens, the end of the lever slides along the bottom of the pan. The principle is very much like the one adopted by Mott in the Demarest valve-closets. The perspective shows an arrangement for opening the pan by pressure on the seat, or, more properly speaking, the stand, as the seat is arranged after the Oriental manner. The stand in this instance rests on two journals, and is connected with a lever, on the short arm of which is a rack. The rack imparts motion to a mutilated pinion, which, partially revolving on its centre, moves the short lever or finger that opens and shuts the pan.

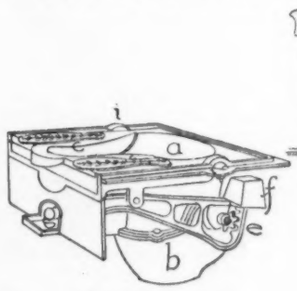


Fig. 113. — Perspective.

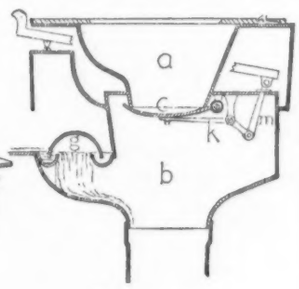


Fig. 114. — Section.

Cazaubon's Pan-Closet.

a, Bowl. *b*, Container. *c*, Pan. *e*, Cogs on lever. *f*, Weight on lever. *g*, Overflow. *i*, Journals. *k*, Short lever or finger. *m*, Connecting-rod.

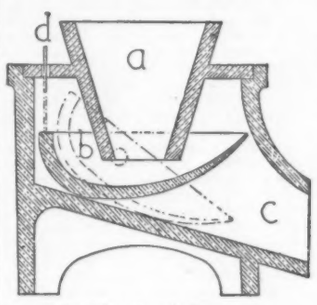


Fig. 115. — Jones's Pan-Closet.

a, Bowl. *b*, Pan. *c*, Receiver. *d*, Rod for holding pan in position.

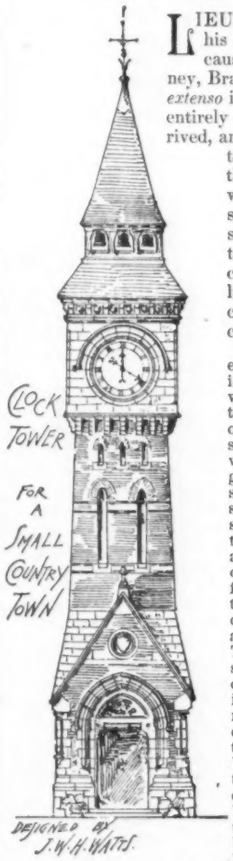
Jones's Closet. — In the year 1860 a patent was issued in England to one Jones, for a tilting-pan very similar to the flushing-tanks now in use, which tilt when the water has attained a certain height. The pan was held in a level position by a small rod, which had a bearing on the rim at the back part of the pan. By raising this rod or hand-pull, the weight in the portion of the pan in front of the journals, on which it was balanced, would cause it to tilt and empty its contents into the receiver.

THE ILLUSTRATIONS.

THE JACOB SLEEPER HALL, BOSTON UNIVERSITY, BOSTON, MASS. MR. W. G. PRESTON, ARCHITECT, BOSTON, MASS.

COTTON EXCHANGE, NEW ORLEANS, LA. MR. H. WOLTERS, ARCHITECT, LOUISVILLE, KY.

THE BRADFORD CHIMNEY DISASTER.



LIEUT.-COL. SEDDON, R. E., has sent in his report to the Home Secretary on the causes of the fall of the Newlands Mill Chimney, Bradford. The report, which is printed *in extenso* in the *Bradford Observer* of the 14th inst., entirely confirms the conclusions at which we arrived, and to which we gave expression, at the termination of the inquest on the bodies of the fifty-four unfortunate operatives who were killed by the disaster.[2] After describing in detail the foundation and construction of the chimney, and the attempts to straighten it, Col. Seddon recounts the circumstances attending the subsequent history and fall of the chimney, and in conclusion makes the following remarks on the causes of its failure: —

"The failure of this chimney was undoubtedly due to the damage done to the structure in the operation of straightening. The only wonder is that it survived that operation for twenty years. One cut would have been serious enough, but the second was fatal to the slice of masonry between the two cuts. The weight of the shaft above, at least 2,200 tons, giving a uniform pressure of 7 tons per foot super., rocking in every wind on this weak spot, slowly but surely disintegrating the masonry; the loose rubble backing, in yielding, threw the weight on the damaged outer casing and the inner brick lining, which latter stood on two independent single-brick cylinders, 30 feet high, the inner one of fire-brick exposed to all the heat of the ascending gases, and the other of red brick laid without any stretchers, at any rate for the greater part of its height. The leaning of a chimney and cracks in the shaft would not be sufficient of themselves to cause any apprehensions of immediate danger in a district where the majority of the chimneys are more or less cracked and many are considerably out of plumb, but, as it happened, those who examined this chimney were misled by a knowledge of its previous history into thinking that the rapid development of the cracks and bulges were merely due to the vibration of the chimney in the wind loosening the old portions of the outer casing which had been built up after the straightening without being tied into the backing, and which had again become loose and undergone similar repairs about sixteen years before. The chimney was in reality daily resting more and more on its outer skin, to remove which, as decided, was no doubt a fatal error. Before, however, this could be done, piece after piece of the outer shell was pinched out, and the rocking of the shaft in the wind on the Wednesday night and Thursday morning completed the destruction of the chimney. A heavy gust came, and the damaged backing, having lost the little tie previously afforded by the outer casing, burst out, and all was over. It is easy to be wise after gaining experience, but the history of this chimney is so exceptional that I doubt if any one would have anticipated any immediate danger. The cutting straight of brick chimneys is an operation of common occurrence, but I am not aware of any stone chimney, except this one and another close by, belonging to Messrs. Sugden & Briggs's works, having been so treated. I unhesitatingly say that it was an operation which ought never to have been

[1] *The Plumber and Sanitary Houses.* S. S. Hellyer, London: 1880. *The Art and Science of Sanitary Plumbing.* S. S. Hellyer, London: 1882.

[2] See *Builder*, p. 163, *ante*.

performed. The design of the chimney was radically bad in almost every particular, and although the actual cause of its falling when it did was the damage done to it in straightening, I feel certain that even without that operation it could only have had a limited life, and unless taken down in time, it would certainly have fallen some day or other. The system of constructing chimneys or any other walls to carry heavy weights, of three or four different parts, each too weak in itself, and yet so put together that they cannot possibly work in unison, cannot be too strongly condemned; whilst the necessity in large chimneys for the fire-brick lining being perfectly independent of the structural part of the shaft is now universally recognized. The fall of this chimney ought to be a warning in future to any one who, dispensing with proper professional advice, takes upon himself the responsibility of carrying out works upon the safety of which the lives of so many may depend. Here we have a self-constituted architect and engineer, with a thoroughly bad design to begin with, for an 85-yard chimney, in which the uniformly distributed pressure at the base of the shaft would amount to over nine tons per foot super., first deciding, after getting about 10 yards above the ground-line, to carry the shaft up to 100 yards instead of 85 yards, with the idea of making it look lighter (this was abandoned after the failure at 70 yards); and next weakening the structure considerably by inserting recessed panels all the way up to ornament the face, and that in spite of the advice of his builder to the contrary. It may not be out of place here to point out that there is a limit to the useful height of a chimney as regards draught; whilst the increase of draught due to increase of height is frequently more than counterbalanced by the losses due to sudden changes of direction in the underground flues, and their want of gradual easing into the chimney, as well as by the unnecessary admission of cold air into the interior of the chimney. Looking to the possibility of there being other factory chimneys in a dangerous condition, as well as to the evidence of the Bradford Borough Surveyor as to the difficulty of getting to know of such cases, whilst he has no power to inspect such structures without some grounds to go upon, it is worthy of consideration whether the factory inspectors might not be empowered to make inquiries on this subject, and to report any cases which may come to their knowledge."

We have received from Mr. John Waugh, C. E., of Bradford, an interesting and concisely-written report on the subject, illustrated with plans and sections. Mr. Waugh, it will be remembered, assisted Col. Seddon in his investigations. Mr. Waugh's report is addressed to the Directors of the Yorkshire Boiler-Insurance and Steam Users' Company, to whom he is engineer, and although primarily written for the benefit of steam-users (all steam-boiler owners being more or less interested in chimney construction), it is likely to prove useful and instructive to a wider circle of readers. Mr. Waugh, whose report is in agreement with that presented by Col. Seddon, concludes by making the suggestion that all "suspicious-looking" chimneys should be inspected *internally* once in every two years. Had the Bradford chimney been so inspected, say a twelvemonth before its fall, its internal condition, as revealed after its fall, "would have put another construction upon the mistaken opinion as to the cause of the cracks in the outside casing, — an opinion only based upon outside inspection, and prevailing, unfortunately, even up to the day of the falling of the chimney." — *The Builder.*

THE DECORATIVE TREATMENT OF METALS IN ARCHITECTURE. — I.

EAST GATEWAY OF THE TEMPLE NISHI-HONGWAN-JI, KIOTO.

THE first of a course of three Cantor lectures on this subject was given at the Society of Arts' room on Monday evening, by Mr. Geo. H. Birch, A. R. I. B. A. Having explained that he should treat his subject from an art, and not from a constructional point of view, the lecturer alluded to the immense importance of the metals to man, asking the audience to transport themselves in imagination to the primitive ages, when metallic currency was not, and consider to what straits they would be reduced when chipping the primeval flint or scraping the pre-historic bone. Co-existent with the first germs of civilization, the use of the metals had expanded with its growth, and, from the cradle to the grave, man was absolutely dependent upon the metals for existence. Numberless generations had passed away, but the metals which they fashioned for use or adornment might still exist, albeit melted, remelted and reformed, divided and dispersed infinitesimally, and might continue in existence for countless ages to come.

Architecture had been well defined by Reichensperger as an "aggregate of various beautiful arts, working principally by means of proportion." Of these arts sculpture and painting took the first rank, but other accessories were employed to enhance the beauties of the building. The more successful would a building be, and the more satisfying and pleasant to the eye, when the subsidiary arts were kept in due subordination to the leading architectural features, and introduced to accentuate rather than destroy their harmony of proportion. In all styles these subsidiary arts must be admitted as necessary, for architecture without them would be cold and lifeless. The employment of the metals to enhance architecture was of equal antiquity with sculpture and painting; indeed, there was scarcely a style of architecture now known to us, from the description of ancient authors or modern research, in which we did not find this use of the metals more or less apparent.

Taking up, in the first place, the employment of the precious metals, gold and silver, in this connection we found in Egyptian hieroglyphics many references to their use. The *stèle* of Hatharsa of the twelfth dynasty stated that he compelled chiefs "to wash gold," and on the tablet of Nebuain, in the reign of Thothmes III, we read that, as high priest of Osiris, "I dedicated numerous works in the house of my father, Osiris, of silver and gold. . . . I was called to the house of gold. . . . I made to thee a secret chapel of stone, the bolts on it of brass covered with gold." And in other passages of the same record we were informed that the folding-doors and the tablets of the temple of Khonsa, in Thebes, were plated with gold, and that the hinges of the gates were of silver, with coverings of gold, while the columns, the cornices and lintels of other temples were referred to as of sandstone, plated with pure gold. Egyptian architecture at the present day showed little trace of any metallic adornment, nor was its use at any time so prevalent there as with the Assyrian, Chaldæan, Babylonian, Medo-Persian, and other Semitic races. Gilding was applied by the Egyptians, not as by us, in sheets beaten to an infinitesimal density, but in strips of considerable thickness, as might be seen by an inspection of some of the mummy-cases in the British Museum and the Louvre. In Egypt, sculpture and painting were profusely employed, to the exclusion of other forms of decoration; but many of the obelisks were decorated with gold, both the pyramidon and base being gilded, and they were often surmounted by a disc of gold. The gold-mines of Midian were extensively worked by the Egyptians. Captain Burton discovered the cartouche of Rameses III in some of the disused workings, and the cartouche of a much earlier King Kheperteara in the Sinaitic peninsula.

The great Assyrian empire was remarkable for its use of the precious metals as architectural adornments. Herodotus told us that the temple built by Nebuchadnezzar at Borsuppa consisted of several stories, diminishing in size, the outer walls of two of these stages being covered with gold and silver respectively; and that at Agbatana, the capital of the Medo-Persian empire, the king's palace had wooden beams, ceilings and pillars covered with plates of gold and silver, and was roofed with silver tiles, and the latter statement was confirmed by Polybius. The temple at Babylon, called by Herodotus that of Jupiter Belus, was also said to be richly decorated with gold.

In the case of the contemporary kingdom of Israel, we knew from the Bible the extensive use made by that purely Semitic race of the precious metals; it being recorded that in the days of Solomon gold was nothing accounted of, and silver in Jerusalem was as the stones of the streets. Even from the time when the children of Israel were journeying in the wilderness they employed the precious metals "borrowed" from the Egyptians in making the sockets, rings, and capitals of the Tabernacle, the columns being overlaid with pure gold — possibly a hyperbolical way of describing plain gilding — and the candle-stick, lamps, and altar of incense being of pure gold. Four hundred and eighty years afterwards a wonderful temple was built by Solomon, of which the chief adornments were metallic. Indeed, one modern manufacturer had gravely attempted to prove that the temple was entirely made of metal, and that no stone was used except for the foundations, basing his belief on the well-known verse (1 Kings, vi. 7) which stated that there was neither hammer nor axe, nor any tool of iron heard in the house while it was building, so that all the parts must have been put together with screws! One might with equal reason start the theory that it was entirely of cedar or other wood, and quote the same chapter as an authority, "as there was no stone seen." Josephus's description of the Temple, although mainly derived from the First Book of Kings, was interesting, as it was interwoven with other traditions; and after allowing for the unintentional love of hyperbole natural to Oriental nations, it was seen that this Temple must have been resplendent with the precious metals, and an object of admiration, wonder, and cupidity to other nations. The description of Solomon's palace having roof and walls adorned with gold, gave an accurate idea of those palaces unearthed by Layard at Nineveh and Khorsabad, even to the sculptured lining slabs and ivory thrones. In the Biblical account mention was made of Hiram, King of Tyre, who assisted Solomon, especially in making the metal ornaments for which the Jews seemed to have had little aptitude, and from Menander we learned that Hiram also dedicated a golden pillar in the temple of Jupiter at Tyre, and rebuilt the temples of Hercules and Astarte.

The lecturer next referred to the poems of Homer, written apparently about eleven centuries before the Christian era. Homer described, in language almost sublime, various palaces and halls, such as those he must have seen or heard of, and while affording no idea of their architectural style, he dwelt much upon the golden doors and the silver ornaments, graphically portraying such a wealth of metallic splendor that, to borrow a phrase of his own, his descriptions "poured along like a fire that swept the whole earth before it." In illustration of this vivid imagery, Mr. Birch quoted from Pope's version the well-known descriptions of the Palace of Alcinoüs, and the Hall of Menelaus in Sparta. Doubts had been thrown on the existence of the Homeric heroes, but Dr. Schliemann's discoveries at Mycenæ, Orchomenos, and Hissarlik, of tombs containing immense stores of gold buried with ancient warriors, was striking testimony in confirmation of the poet's story. In a lesser degree we found the same in the tombs of the primitive inhabitants of Italy, the Etruscans, pointing to a common origin, perhaps Pelasgic. Turning back to Greece, we were tempted to ask, as we gazed upon the ruins of the Parthenon or the Athenian Acropolis, could there

possibly have been room for any decoration in this temple beyond the perfect symmetry of its own faultless proportion? The answer must be in the affirmative. Not only was color applied, as we saw, beyond power of dispute, in the sculptures by Phidias, now in the British Museum, but metallic decoration also lent its aid in adding to a beauty almost perfect in itself. On the Parthenon were still visible the holes for clamps in the architrave, and circular stains upon the marble, showing that under each of the metopes was suspended a gilded shield, and smaller holes under the triglyphs indicated that inscriptions in gilded letters formerly existed between each. These had been supposed to indicate the votive offerings of shields taken by Alexander from the Persians, and given by him to the Parthenon; but the lecturer believed they formed part of the original design. The acroteria which decorated the mounts and corners of the pediments were also of gilded metal, and the railings or grilles between the columns and the antæ were likewise gilded. Passing within, the most prominent object was the chryselephantine statue by Phidias, in which the glittering golden raiment and crested helm contrasted with the soft creamy beauty of ivory flesh. We knew that the Temples of Jupiter at Olympia, and of Apollo at Delphi were also full to overflowing with the votive offerings of generations. The inner sanctuary of Herod's Temple at Jerusalem was decorated with a golden vine; indeed, so immense was the quantity of gold in this Temple that after the destruction of Jerusalem gold was sold in Syria, by the soldiers of Titus, for half its value.

Passing on to Imperial Rome, one was almost bewildered by the many examples of the employment of the precious metals in the adornment of its edifices, such as the Golden House of Nero, the gilded Capitol, the Temple of Ceres, and the gilded statues and trophies of the Ulphian Basilica. In the New Rome, on the banks of the Bosphorus, the same traditions as to the use of the precious metals were maintained. The church of St. Sophia must, in the days of its first magnificence, have been refulgent with the precious metals; apart from the universal use of gold and silver mosaics in its dome and vaults, the columns of the ciborium and the baldacchino over the altar were formed of silver-gilt; the sculptured lilies and fruits which adorned it, and the cross which surmounted it, were of solid gold; and of gold were also the solea and ambones. At the Church of the Resurrection, in the same city, the under side of its wooden vault was covered with plates of gold by Basil, the Macedonian. In the Church of St. Demetrius, at Thessalonica, A.D. 458, there was a ciborium of silver, and the shrine of the saint was hexagonal; both the six columns and the walls being of silver, covered with incised ornament, and the circular cover and the sphere and cross above were also of silver. This seemed to have been the prototype of many of the gorgeous shrines of Mediæval churches. The three immense basilicas at Rome:— St. Peter, St. John Lateran, and St. Paul-without-the-Walls, were rich in the precious metals. In some of the Italian churches, and also in Spain and Germany, were still preserved magnificent altar-pieces of silver-gilt, called *pala d'oro*.

In St. Mark's, Venice, was a superb specimen which was uncovered on great festivals; it was of Byzantine workmanship, and richly jewelled; it was made in 976 by order of the Doge Pietro Orseolo, but was much altered by successive Doges. St. Ambrose's Church, Milan, possessed one of the richest in Christendom, and slightly earlier (A.D. 835) than the Venetian one. The front was of gold, and the sides and back of silver; it was richly enamelled and set with jewels. The name of the artist had been preserved, Wolvernius. In the Duomo at Monza, was an altar-frontal silver-gilt, of the tenth century, and at Citta di Castello, a silver altar-piece of the twelfth century. A magnificent *pala d'oro*, formerly in the Cathedral of Bâle, now formed one of the chief treasures of the museum at the Hôtel Cluny, Paris. It was given to the cathedral by the Emperor, Henry III, about the commencement of the eleventh century, and, although betraying Greek influence, was probably of Lombardic, and not Byzantine, workmanship. It was of solid gold, on a foundation of cedar, and was remarkable for the lifelike energy of the figures in high relief, and exquisite workmanship of the foliage, animals, and filigree enrichments. The tomb of St. Margaret, in the church of the same name at Cortona, was of the thirteenth century, and had a silver front. At Florence, in the Opera del Duomo, was preserved a silver retable beautifully enamelled; it was five feet high, fifteen feet long, and was divided into twelve compartments, and in the centre was a figure of St. John. Begun in 1366, it was not finished till 1477, and Ghiberti, Orcagna, Verrochio, and other artists worked upon it. In the present day gold and silver were far too precious to be used except in ordinary currency; in Europe alone it was estimated that these metals were employed for this purpose to the extent of over two thousand billion sterling, — or in small objects of use or ornament.

THE DECAY OF BRICKS. — Recent observations of M. Parize tend to show that the weathering of brick walls into a friable state, which is usually attributed to the action of heat, moisture and frost, is in reality due to a microscopic creature, the action played by the weather being only secondary. M. Parize examined the red dust of crumbling bricks under the microscope, and found it to consist largely of minute living organisms, and a sample of brick-dust taken from the heart of a solid brick also showed the same animalculæ, but in smaller numbers. The magnifying power of the instrument was about 300 diameters, and every brick showed the same distinctive features, but, in general, the harder the brick the fewer were the organisms. — *Engineering*.

BERMUDA HOUSES.

THREE men are at work on this side of a little hill within sight of the hotel, digging out a house. Anybody who would travel all over these Bermuda Islands would no doubt find as many as a hundred men engaged in digging out houses. There is nothing remarkable in this digging houses out of the ground, although at first there seems to be. I have seen houses dug out in New Jersey — some very nice houses. There they did them in the shape of clay, moulded it into bricks, and put the houses together afterward. In Bermuda they are saved this trouble, for the clay, or coral sand, or whatever it is, is already made into rock, and the workmen have nothing to do but saw it out in big blocks and stand it aside to season. It seems natural enough to an American to see wood standing by to season, but Bermuda is the only country in the world where they season rocks before using them. These three men at work on the hillside are very deliberate in their movements. They could give a New York laborer points in killing time. In this respect they are like most of the Bermuda workmen; but they get so little pay I think they are justified in doing as little work as possible. A dollar a day is as much as they earn, but they do not live on bread and water. The roof of one of the largest buildings in town, the Mechanic's Hall, is just at the foot of the hill on which the hotel stands. Two men have been whitewashing this roof for the last two weeks. Any man of ordinary whitewashing ability ought to do it in a day. But over on the hill three men have been at work for a month. Their tools are a great chisel with a long wooden handle and two or three big hand-saws. They began work by smoothing off a small space on the top of the hill, and a part of one of its sides. Every hill on the islands is composed of this same kind of rock, covered with a thin coating of earth, in which grass, flowers, and small cedar trees grow. The part of this rock that is exposed to the air is of a rusty black color, and looks hard and old; but when it is cut into the surface exposed is of a rich cream color, just about like the yellow bricks sometimes used in New York. The smooth place on the side of the hill is about six feet high, and it looks like a slice out of an immense lump of light brown sugar. The men go to work with the chisel and cut out a slice of the hill as large as they can conveniently handle — generally about six feet long and perhaps four feet broad, and the same in thickness. When this block is detached and rolled over on its side the men go at it with their saws and cut it into stones of the required size. These are nearly always cut to a standard size for building purposes, about two feet long by ten inches square. The blocks are as sharp-cut as so many bricks, and as regular in size as in shape, and as fast as they are cut out they are piled in heaps, like cord-wood, to dry. These heaps are generally put on the side of the road, and all over the islands may be seen cords of stone ready to be put together into houses.

They call this material stone, and I am not prepared to give it any other name, but it does not seem like what we are accustomed to call rock. If you were to take the coarsest sea-side sand you could find, and press a bushel or so of it into a square cake, it would be very much like this stone. In consistency, in color, and to the touch it is like the crumbly, yellow kind of molasses candy confectioners sell, — only, of course, it is not sticky. When newly cut out the blocks look rich and clean enough to eat. The stone is then so soft that you can take an ordinary penknife and whittle it easier than a piece of soft pine. It is only a minute's work to drill a hole through the centre of one of the blocks. The solidity of the rock varies in different places. In some hills it is pretty hard when first taken out, and in others it is so soft that it cannot be worked at all, but crumbles into sand as soon as touched. The hard hills are regularly worked for quarries, and the soft hills afford browsing room for goats. When this stone is cut into thin slabs it has to be handled very carefully. They cut the blocks into slices about an inch thick for roofing purposes, and one of these pieces, if held by the two ends when fresh, would break by its own weight. The rock is exceedingly porous. Indeed, it is almost like a sponge, for it is capable of absorbing its own weight of water. A block of it weighing one hundred pounds, if dipped in the sea, comes out weighing two hundred. Fortunately they don't sell it by weight, or you may depend upon it the Bermudians would sell it damp.

A man who is going to build a house has as many of the blocks sawed out as will be necessary for the walls; and thin slabs for the roof, and lets them stand and season for a year or more. If he is in a hurry to build, (but he never is if he lives in Bermuda,) he buys stones that are already hardened. By the end of a year his blocks

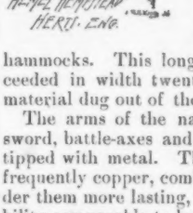
will be hard enough to use, but not hard like the stones we are accustomed to in America. After they have been exposed to the air for fifty years, you can cut notches in them with a penknife. It does not take the Bermudian long to choose a site for his house. In the towns of Hamilton and St. Georges, as in other towns, a man must take what vacant spot he can find, but out in the country when a man owning any considerable quantity of land wants to build a house he makes for the top of the highest hill. Hill-tops are the favorite places, and valleys are at a discount. This seems strange, for the valleys have the richest of soils, and are filled with tropical vegetation that would not flourish on the hills, where the sea-breezes blow. There is no doubt some good reason for it, but I do not know what it is. Perhaps the Bermudians are fond of a view of what they consider "the whole boundless continent;" perhaps the high lands are healthier. I think the latter is the more probable, though I have never heard of any sickness in the valleys. If the hill-top selected for the house is composed of hard rock, the blocks are cut out on the spot, and the excavation thus made does duty for a cellar. It is commonly said that a Bermudian cuts his house out of his cellar, but this happens only occasionally. No foundation needs to be built, for the basis is the rock itself of which the whole island is made. It is an easy matter, of course, to lay the blocks on top of one another with a little cement between; but the roof is not so easily made. The framework of the roof is made of cedar, and curiously enough, it is made and put together on the ground, the pieces mortised and dovetailed together, and, when all complete, is taken apart and put up where it belongs. It has rafters, like our roofs, with light longitudinal slats, about six inches apart, on which the stone slabs are laid. The roof is usually the most expensive part of the building, for cedar is dear. A tree of any size is worth a guinea just as it stands. They use as little firewood as possible, for it is costly. Such small pieces of cedar as are not fit for anything else, and logs too thin for better uses are sold for fuel; but not sold by the cord, nor even by the bundle, as we buy kindling in New York. It is sold by the pound, at the rate of twenty pounds for sixpence, which would bring it to $12 a ton. And any morning visitors may see little ebony shavers about the wood market, telling the salesman that "mam" sent them after twenty pounds of wood. The floors of the houses are made of pine, which is all imported; but all the other material is native. In making the roofs the slabs of stone are laid on like slates, and the roof-maker has to be careful to step only over the rafters, or his foot will go through. The interior partitions are made of the same stone; and when the house is finished its owner has a structure that, if it should rain, would absorb about two hogsheads of water to the square yard; but he does not give the rain a chance. As soon as the walls and roof are up he covers them with a coating of thin cement that makes them absolutely water-proof. This cement is put on the walls within and without, and there is no lathing. The same stone that makes part of the exterior wall forms a part of the wall of the room. As soon as the cement is dry the whole thing is covered with a coat of whitewash — roof, walls, and all; but it is whitewash that will not rub off. They have a way of preparing the wash so that it is as firm as paint. Sometimes they do it by putting a little turpentine in it, and sometimes they put in a decoction of prickly-pear leaves; but whatever they use, the visitor may lean against the whitest wall with a broadcloth coat without fear of soiling it.

When all this is done the Bermudian has a house that will last a thousand years. Every year it stands it becomes harder and stronger. In such a climate as they have here the building will outlast even such an extended family as that of the Duke of Argyll, or the Rex family of England. If there should ever be a frost half of the houses in Bermuda would crumble, but a frost has never been known here. There still remains, however, a very important part of the building to construct. This is the water-tank. It is said by everybody who has written anything about Bermuda that there are no wells in the island, but I know this to be a mistake, for I have drank water out of several Bermuda wells. There are not, though, more than half a dozen wells in the whole islands, and the people depend entirely upon catching rain-water. For this purpose they build large tanks, generally in the shape of a little addition or "lean-to" at the back of the house, just as in America we build a wood-shed. An ordinary tank usually holds three or four hundred barrels of water, which is carried from the roof by a stone gutter. The tank is built of the same kind of stone, lined with cement, and has a little window in one side, through which the cook reaches with a pail and dips out the water as she needs it. The water contained in these tanks stands till it is used but never becomes foul, and no one would notice the difference between Bermuda rain-water and the best Croton. Every house has its tank, and there is a constant supply of hundreds of millions of gallons scattered over the island. In the town of Hamilton every householder is required by law to build a tank, and in other parts of the island they do it from necessity without legal compulsion. There is plenty of rain and no danger of a lack of water, but the Government has built a steam-condenser at St. Georges to supply the troops with fresh water in case there should be a continuous drought. But save in exceptional seasons there is generally a little shower nearly every morning, lasting, sometimes, only five or ten minutes, sometimes for half an hour, and always followed immediately by bright sunshine. For the last three weeks there has been hardly a drop of rain and everything is very dry. In these three weeks the thermometer has not varied ten degrees, ranging between 69° and 78°, till I have almost come to believe it is a sort of stationary thermometer without the power of going either up or down.

The native style of Bermuda house is square, the larger ones with four-sided roofs, the smaller with two sides. Most of the large houses are two stories high, but there are many one-story ones. There is no earthly excuse, in my opinion, for building a house more than one story high in such a place as Bermuda, where there is plenty of building material and land is cheap. There are not more than four or five three-story buildings on the islands, and it is only in later years that any effort has been made to get out of the old style of square houses, with nearly flat roofs. Probably the largest dwelling-house in Bermuda is the residence of J. H. Trimingham, where the Princess Louise is staying. This is two stories high, and looks somewhat like an American country house.

What does it cost? That's what a New Yorker generally wants to know. Outside of Mr. Trimingham's, I do not see how any private house on the islands can have cost more than $2,000. Labor is cheap, material is plenty, and land can be bought low. This is, of course, merely for the house — the walls and roof and floors — and does not include any ornamentation or furnishing that fancy may suggest. There are plenty of places in Bermuda that could not be duplicated for ten times the sum named, but the expense is in the contents, not in the building. A New Yorker could come down here and with $10,000 make himself a residence that could not be duplicated in the metropolis for a million. Servant girls get $5 and $6 a month, and everything is cheap but meat, which is dear. Any New Yorker who contemplates building in Bermuda, need not be kept away by the fear of taxation. Americans, of course, cannot buy land there at all without taking the oath of allegiance to the British Government, but they get a friend to buy property and then take a mortgage on it, which answers the same purpose. The Hamilton Hotel is one of the finest buildings in Hamilton, perhaps without any exception the best; and the taxes on building and grounds are "two and six" a year, or about sixty cents. On an ordinary dwelling-house and lot the tax is about twenty-five cents a year. This is because the imperial Government pays nearly everything and leaves very little for the Bermudians to settle for. The Government "runs" the schools, the Church, the roads — everything.— *Correspondence of the N. Y. Times.*

HARDENED COPPER AND THE ART OF DRESSING AND CARVING STONE AMONG THE ANCIENT PERUVIANS.[1]



At the time of the conquest, Peru extended from the Second degree North to the Thirty-seventh degree South latitude, from Quito to Cusco. A road, whose present remains attest its importance, traversed it for nearly eighteen hundred miles, over mountains often covered with snow and furrowed by forests, which last were crossed by singular suspension bridges, which oscillated like hammocks. This long highway, paved with flagstone, rarely exceeded in width twenty to twenty-three feet, and was built from material dug out of the Cordilleras.

The arms of the natives were bows and arrows, a kind of short sword, battle-axes and lances. The arrows and lances were often tipped with metal. Their utensils were sometimes stone, but more frequently copper, combined with tin in certain proportions, to render them more lasting, but without acquiring by this mixture a durability comparable to brass or even approaching that of iron. By an analysis made under the direction of Humboldt, one ancient bronze instrument showed a combination of copper 94 parts, tin 6 parts; another specimen yielded copper 95.5, tin 4.5.

While remains in *worked* stone are rare in Peru, nevertheless the mines of Fiahuanaco, Ollantaytambo, and the locality called La Fortalezza, with some others, yielded stone thus worked, and with an admirable perfection of line and surface; but these constructions belong to a very ancient period, far anterior to the time of the Incas.

The quarries from whence all these stones seem to have been taken are found about forty-five miles in a straight line from the actual town of Fiahuanaco, on the isthmus which joins Copacabana with the main land.

M. Raimondi says that the ancient Peruvians split up the stone in the quarry by first heating it by the burning of straw, and then throwing cold water upon the heated mass. In building with this material they used inclined planes, up which the stone was drawn by cables made by the Indians. The tools of "hardened copper," as the author calls them, were similar in shape to our chisels, with a cutting edge at one end only.

To carve the stone and obtain a bas-relief, M. Raimondi contends that the workmen covered with ashes the lines of the design which they intended to have in relief, and then heated the whole surface. The parts of the stone which were submitted immediately to the action of fire became decomposed to a greater or less depth, while the designs protected by the ashes, which is a bad conductor of heat, remained intact. To finish his work the sculptor had only to pass lightly over the design with his copper chisel.

Of mortar they used several kinds: with a species of bitumen very abundant in certain parts of Peru they made a cement which hardened quickly and held firmly; a mixture of lime and bitumen was used in the construction of their irrigation canals. Clay was

[1] Translated by *Engineering News* from the *Moniteur Industriel.*

used to make unburnt bricks and cements, and in some localities use was made of a calcareous stone, to which was added a variable quantity of clay, making a kind of hydraulic lime. The largest unburnt bricks were from three to five feet long, and two and a half to three feet thick.

In ordinary constructions the walls of either burnt or unburnt brick rarely exceeded in thickness sixteen inches, but sometimes they were twenty-two to twenty-five feet thick, and in certain aqueducts as much as forty feet thick, to guard against the shock of earthquakes. When the Peruvians wished to make a wall of great resisting power, having only small material at their command, they obtained the required volume by raising two or three of these walls, sometimes more, one behind the other.

LIME KILNS.

PARKERSBURG, W. VA., May 3, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you refer me to any person who can give me information how to build a *lime kiln* capable of making 400 bushels per day. Or if you know of any book on *lime-burning* and *kiln-making*, you would oblige me very much by letting me know through your valuable paper. SUBSCRIBER.

[WE do not know of any modern American book on the subject. Perhaps some of our readers can give you the necessary information.—EDS. AMERICAN ARCHITECT.]

ROUGH-CAST IN NORTHERN LATITUDES.

May 5, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Will you please answer the following questions through the columns of the *American Architect?* Will the climate of the Middle States admit of a successful treatment of rough-cast plaster-work for the exterior of a frame building? If so, what are the ingredients and their proportions and what the method of their application? Can ordinary pine lath be applied for the reception of the plaster? Can color,—Indian red, yellow ochre, for example, —be mixed with the plaster without materially affecting strength, etc. Very truly yours, F.

[THERE is no difficulty in using rough-cast plaster on the exterior of frame buildings in the Middle or Northern States. The mortar should be mixed as for the first coat of plastering, but without gauging with plaster-of-Paris, and cement may with advantage be mixed with the lime in as large proportion as it will bear without setting too quickly. We should generally use one part cement to two of dry lime, and if the plaster is to be colored, would mix a small quantity of linseed oil with the mortar. The first coat is often put on pine laths, but stands very much better on wire lathing. The wire lathing should be of the heaviest quality, so that it will not move under the necessary manipulation, and thereby split the coat of mortar in two. After applying the mortar, and while it is yet soft, patterns may be impressed in it with wooden moulds, or pebbles, bits of colored glass, or other ornaments may be imbedded in it. The ancient way of applying "rough-cast," or "pebble dash," was, after the first coat had become somewhat hard, to mix the pebbles with a thin lime mortar, and throw the mixture on the wall. Whether this mode is ever imitated now we cannot say. The addition of color to the plastering mortar has little or no influence on its strength, but there are not many colors which will resist the caustic action of the lime. Venetian red is one of the best; yellow ochre is also excellent for such uses, and gives a good color. French blue can also be used. The two former colors retard slightly the drying of the mortar.—EDS. AMERICAN ARCHITECT.]

THE BEST BOOK ON PERSPECTIVE.

CHICAGO, May 5, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen,— Will you be so kind as to inform me through the *American Architect* which is the best book on perspective.

Respectfully yours, H. G.

[*Modern Perspective*, a Treatise upon the Principles and Practice of Plane and Cylindrical Perspective, by Professor William R. Ware. Published by James R. Osgood & Company, Boston, Mass. Price $5.00.—EDS. AMERICAN ARCHITECT.]

BOAT-HOUSES.

197 DE KALB AVE., BROOKLYN, N. Y.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Sirs, — Can you put us in communication with some builder that makes a business of building boat-houses. Myself and friends are desirous of building a small boat or club house at a place called Centre Moriches, Long Island. We would like to find out how much it would cost to build a house 20′ x 35′, one story, with a 10-foot piazza on the four sides. Also the cost with a 12-foot piazza on the 35-foot side *only*. If you can do anything for us you will confer a great favor on a reader of your paper. Yours respectfully,

R. B. PRICE.

[WE do not believe that there are enough boat-houses built in the whole country to warrant any man in undertaking such work as a specialty. Any reputable builder can figure out the cost of the house, you wish to build in half an hour.—EDS. AMERICAN ARCHITECT.]

VIOLLET-LE-DUC once said that the locomotive was as great a piece of pure architecture in its way as a cathedral.

NOTES AND CLIPPINGS.

SINKING OF A LARGE BUILDING. — A curious instance of the difficulties which the peculiarities of tropical soils give rise to when dealing with the foundations of heavy buildings has recently occurred in Georgetown, the capital city of British Guiana. Designed by the government engineer until lately in charge of the Public Works Department of that colony, some erections intended for use as law courts had proceeded to a certain point, when the successor to the office above named discovered that the buildings were bodily sinking, and this — as far as we have been able to learn — was taking place without any settlements or cracks being visible in the walls of the building, and without any disturbance of the surface soil close to them. In fact, it was not easy to detect the immediate cause of the subsidence, but it was ultimately found that at a few yards distance the ground was bulging upward. The present head of the Public Works Department in his report in no way reflects upon the character of the design given by his predecessor to the footings, or on the dimensions of the foundations. There is nothing, indeed, in these to find fault with, and the difficulty has arisen apparently from the two-fold character of the soil in the immediate vicinity of the buildings; that on which the work is erected being of good, solid, unyielding sand, but being surrounded to all appearance by a bed of earth less capable of withstanding either vertical or lateral pressure. The consequence has been that this surrounding belt of earth has yielded upward to the force exerted upon it by the lateral thrust of the squeezed material immediately below the buildings. — *Scientific American.*

PROPOSED NEW LIGHT-HOUSE IN LOWER DELAWARE BAY. — The Fourteen-foot Bank in the Lower Delaware Bay, between the Brandywine and Cross-Ledge Shoals, has had for years stationed upon it a light-ship. Owing to the heavy flow, it has been found almost impossible to keep this light-ship in position, especially in the winter months, when most needed. In order to secure the permanent location of this beacon, as well as to guide vessels not only clear of the Fourteen-foot Bank, but also from the lower end of the Joe Flogger Shoals, the Light-house Board has decided to erect a light-house on this spot. There are peculiar engineering difficulties surrounding this project, since there is a depth of 21 feet of water over the Fourteen-foot Bank, and then a depth of some 23 feet of quicksand to be got through before a solid stratum of clay suitable for foundation can be reached, there being no rock bottom at this point. The plans of the engineers under consideration at the present moment comprise a caisson 50 feet in diameter at the base, 30 feet diameter at the top, and 43 feet in height. It is proposed to build the caisson of cast-iron plates made separately and bolted together on the inside by flanges, the outside surface being smooth and regular. There is now available an appropriation of $175,000 for the prosecution of this work. It is proposed to float the caisson into position by means of a "camel," and by pumping the water into this latter to gradually sink the caisson to its foundation level. The pump to be employed for this purpose is designed for a capacity of 500 gallons per minute. From present indications it would seem as if the contracts for the work would be given out before the close of the present year. — *The Iron Age.*

THE PALACE OF THE POPES AT AVIGNON. — A correspondent of the *Daily News*, writing from Avignon, says: —"Many of your readers will, I feel sure, be glad to hear that the French Committee for the Preservation of Historical Monuments has at length succeeded in making an arrangement by which the Palace of the Popes in this interesting old city will shortly cease to be used as barracks for the garrison. This act of vandalism dates from the first year of the reign of Louis XVIII., and since that time much irreparable damage has been done to the frescoes, while many of the rooms have been disfigured by whitewash. Party-walls have been knocked down in some places, and wooden partitions run up in others, and despite all that has been done the palace has not, as may readily be imagined, been at all comfortable as military quarters. Remonstrances against the barbarous use to which this historical building was being put have been made from time to time for the last fifty years, and just before the fall of the empire it seemed as if the scandal would shortly cease, for some new barracks were built for the garrison close to the station. But just as they were ready for occupation the war with Germany broke out, and after it was over the French pontoon corps, whose headquarters were formed at Strasburg, was sent to Avignon to do their exercises upon the Rhône, now that the Rhine was no longer available. So the ordinary garrison perforce remained in the Papal Palace, and some fresh arrangement had to be made. M. Viollet-le-Duc, the eminent architect who restored the ramparts of Avignon with so much ability, did his best to obtain the consent of the Minister of War to the erection of fresh barracks, but he died before anything was settled, and the Committee for the Preservation of Historical Monuments has experienced great difficulty in extracting a definite promise. This promise has, however, been given, but the Palace will not be evacuated until the new barracks are finished."

INGENIOUS BUT IMPROBABLE. — A Buffalo manufacturer of lime and cement, Mr. Cummings, says that he has examined the Egyptian obelisk in Central Park, New York, and finds that it is not natural stone, as has been generally believed, but rather a mass of concrete composed of pieces of granite from the size of a walnut down to that of wheat. These stones are mixed with some bituminous matter not unlike asphaltum, and the stones and asphaltum are mixed with hydraulic lime containing clay. The thinness of the lime shows, according to Mr. Cummings, that the men who made the obelisk knew how to make concrete. The hieroglyphics must have been formed by fastening letters on the inside of the box into which the concrete was placed, every letter being made to "draw." The obelisk can be carried up by this process at the rate of about a foot a day, and can be exactly reproduced now at an estimated cost of $15,000. There is no doubt that it will last for ages, which would not be the case if Roman cement instead of hydraulic lime had been used.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

276,549. Brick and Tile Machine.—James C. Anderson, Highland Park, Ill.

276,563. Shutter and Fastening therefor.—Jonas Cooper, Washington, D. C.

276,585. Fire-Escape.—George Hofmann, Jr., and Austin D. Hoffmann, Chicago, Ill.

276,587. Store.—Jas. A. Houston, Boston, Mass.

276,610. Fire-Escape.—George W. Lindsey and Harry W. Raleigh, Baltimore, Md.

276,622. Vise.—Jacob A. Painter, Arthur, Ill.

276,623. Locking-Latch.—Frederick Palmer, Hampton, Va.

276,626. Door-Opener.—Martin L. Powell, New Castle, Ind.

276,654. Eaves-Trough Hanger.—Jonathan P. Abbott, Cleveland, O.

276,669. Fire-Escape.—William F. Clerk, Boston, Mass.

276,715. Fire-Escape Ladder.—James Riley, New York, N. Y.

276,730. Fire-Escape.—Albert P. Sturtevant, Norwich, Conn.

276,736. Fire-Escape.—Henry B. Walbridge, Brooklyn, N. Y.

276,761. Incidence-Window.—Friedrich Bredehorst, Bremen, Germany.

276,767. Automatic Elevator-Hatchway Guard.—Joseph Byers, Newtonville, and George Taylor, Everett, Mass.

276,784–785. Elevator.—Levi Daso, Pioneer, O.

276,815. Fire-Escape.—Gustavos Heidel, St. Louis, Mo.

276,831. Windmill and Derrick.—Isaac W. Lamb, Parshallville, Mich.

276,849. Safety-Apparatus for Elevator-Platforms.—Volney W. Mason, Providence, R. I.

276,856. Machine for Making Roofing Fabric.—Henry M. Miner, Pittsburgh, Pa.

276,858. Door-Lock.—Alphonse Montant, New York, N. Y.

276,861. Dry-Pressing Brick-Machine.—Henry B. Morrison and George Willett, Motley, Minn.

276,886–887. Window-Sash.—Alexander Rudolph, San Francisco, Cal.

276,913. Sash-Weight.—Gary B. Smith, Denver, Col.

276,942. Knob-Attachment.—Robert S. Watson, Bay City, Mich.

276,958. Spring-Hinge.—Charles B. Clark, Detroit, Mich.

276,969. Fire-Escape.—Arthur C. Hitchcock, Decorah, Iowa.

276,973. Fire-Escape.—George Kelly, Chicago, Ill.

SUMMARY OF THE WEEK.

Baltimore.

Police Station.—Messrs. F. E. & H. R. Davis, architects, are preparing drawings for a three-st'y building to be erected cor. Calhoun and Pratt Sts., to be designated the Southwestern Police Station. It will be of brick and stone, 43′ x 93′, and cost $30,000.

Store and Hall.—Mr. W. F. Weber, architect, is preparing drawings for Jas. Billingsley, Esq., for a two-st'y building to be erected cor. Gay and High Sts. It will be of brick, with stone and terra-cotta finish, 27′ x 95′, and cost $8,500.

Dwellings.—G. A. Blake, Esq., is about to erect two Amherst stone front houses, on Biddle St., between Charles and St. Paul Sts., each 18′ x 65′, and to cost $12,000, from designs by Messrs. J. A. & W. T. Wilson, architects.

Building Permits.—Since our last report twenty permits have been granted, the more important of which are the following:—

A. L. Gorter, 9 three-st'y and mansard brick buildings, n s Preston St., between Maryland Ave. and Morton Alley.

E. S. Purkey, 12 three-st'y brick buildings, e s Gilmor St., n e cor. Gilmor and Mulberry Sts., and 4 three-st'y brick buildings, n s Mulberry St., e of Gilmor St.

Chas. M. Kraemer, two-st'y brick building, s s Portland St., between Greene and Emory Sts.

Dubriel & Co., four-st'y warehouse, n s Baltimore St., between Howard and Eutaw Sts.

Ann Morgan, three-st'y brick building and two-st'y brick stable in rear, e s Mount St., between Lanvale and Townsend Sts.

A. L. Townsend, two-st'y brick building, 40′ x 90′, w s Race St., between Wells and McComas Sts.

Boston.

The Month's Work.—During the month of April, 21 brick and 119 wooden permits were granted at the office of Inspector of Buildings.

Building Permits.—*Brick.*—*Chelsea St.*, cor. Foss St., Ward 5, for Patrick O'Riordan, family hotel, 32′ 6″ x 43′ 6″, four-st'y flat; family hotel, 26′ x 42′ 4″, four-st'y flat; dwell. and store, 13′ and 40′ x 42′ 4″ and 42′, four-st'y flat.

Newbury St., Nos. 138 *and* 140, Ward 11, for Alden Avery, 2 dwells., 24′ x 53′, three-st'y mansard; Alden Avery, builder.

Garrison St., near St. Botolph St., Ward 11, for Massachusetts Institute of Technology, mechanical, 131′ 8″ x 150′ two-st'y flat; and boiler-house, 24′ x 24′, one-st'y flat.

Washington St., Nos. 81–89, *and Elm St., Nos.* 18–24, Ward 7, for Howard Sargent, trustee, mercantile, 54′ x 45′ and 74′, five-st'y flat.

Wood.—*Maverick St.*, rear, near Jeffries St., Ward 2, for Columbia Boat Club, boat-house, 30′ x 60′, two-st'y pitch; A. & J. McLaren, builders.

Western Ave., rear, nearly opposite Everett St., Ward 25, for P. O. Callahan, storage of wagons, 18′ x 50′, one-st'y pitch; Geo. Hudgate, builder.

Dorchester Ave., Ward 13, for Continental Sugar Refining Company, storage-building, 120′ x 187′ 6″, and 96′ x 146′, one-st'y flat; John K. Peke, builder.

Virginia St., cor. Davenport Ave., Ward 20, for Lucien J. Fosdick, dwell., 30′ x 37′, two-st'y pitch.

East Fifth St., *No.* 687, Ward 14, for Lorenzo D. Cardell, carriage-house, 18′ x 40′, one-st'y flat.

West First St., cor. B St., Ward 13, for Boston Cooperage Co., cooper-shop, 100′ x 400′, two-st'y flat.

Corbett St., near Norfolk St., Ward 24, for Samuel B. Pierce, dwell., 21′ 2″ x 32′ 7″, two-st'y pitch; W. J. Jobling, builder.

Commercial Point Wharf, near Union St., Ward 24, for Boston Gas Light Co., storage of coal, 179′ and 192′ x 248′ 6″ and 278′, and 14′ x 270′, two-st'y flat; Geo. Barker, builder.

West Fourth St., Nos. 45 *and* 47, Ward 13, for James Devine, 2 dwells. and stores, 19′ x 32′ each, three-st'y flat; James Devine, builder.

Forest Ave., Ward 21, for Lucinda F. Tripp, 2 dwells., 24′ x 37′, two-st'y pitch; John G. Allbright, builder.

Centre St., near Lamartine St., Ward 23, 2 dwells., 24′ x 36′, three-st'y flat, for Wm. Magee; Jas. Cook, builder.

Melville Ave., near Wardeck St., Ward 24, for Julius Pratt, dwell., 24′ and 29′ x 38′, and 12′ 8″ x 22′ 6″, two-st'y hip; Chas. Haywood, builder.

Tremont St., No. 86, Ward 3, for P. J. Navy, 2 dwells., 19′ 6″ x 30′, three-st'y flat; John Hayes, builder.

Regent St., near Dale St., Ward 21, for John P. Santry, dwell., 31′ x 40′, three-st'y flat; dwell., 32′ x 40′, three-st'y flat; Andrew P. Anderson, builder.

Washington St., rear, near Keyes St., Ward 23, for Boston Thread and Twine Co., storehouse, 15′ x 69′, one-st'y flat; Chas. H. Lewis, builder.

Bearse Ave., near Butler St., Ward 24, for Henry G. Healey, dwell., 22′ x 28′, two-st'y pitch; Joseph A. Healey, builder.

West Seventh St., Nos. 105 *and* 157, Ward 15, for Sarah O. Malley, dwell. and store, 28′ x 30′, three-st'y flat; Isaac H. Y. Dunn, builder.

Dorchester Ave., near Greenwich St., Ward 24, for Patrick & Michael Finnegan, dwell., 27′ x 32′, three-st'y flat; Michael Ryan, builder.

Mayfair St., near Bainbridge St., Ward 21, for Thomas J. Thomas, dwell., 21′ 2″ x 50′ 7″, two-st'y pitch; Charles H. Blodgett, builder.

Eagle St., No. 260, Ward 1, for James M. Simpson, dwell., 28′ x 45′, two-st'y pitch; James Emroe, builder.

Dorchester Ave., cor. Alger St., Ward 15, for Alfred L. Armstrong, dwell. and store, 32′ x 40′, two-st'y flat.

Rutherford Ave., No. 82, for John Donovan, dwell., 13′ and 20′ x 28′ and 33′, three-st'y flat; Edward J. Tulley, builder.

Waterloo St., rear, near Harvard St., Ward 24, for Geo. L. Studley, stable, 15′ x 18′, one-st'y pitch; Geo. L. Studley, builder.

Brooklyn.

Building Permits.—*Van Buren St.*, s s, 24′ w Sumner Ave., 6 two-st'y brownstone front dwells.; cost, each, $5,000; owner and builder, Patrick Concannon, 187 Wythe Ave.; architect, I. D. Reynolds.

Van Buren St., s w cor. Sumner Ave., three-st'y brownstone front store and flats, tin roof; cost, $10,000; owner, etc., same as last.

Halsey St., s s, 240′ e Lewis Ave., 3 two-st'y brick dwells., gravel roofs; cost, each, $5,500; owner, L. M. Nichols, 496 Macon St.

Meserole Ave., s e cor. Newel St., four-st'y frame tenement, gravel roof; cost, $5,000; owner, James Burke, on premises; architect, F. Weber; builder, J. Fallon.

Twenty-seventh St., n s, 260′ e Third Ave., three-st'y brick tenement, tin roof; cost, $4,000; owner, Patrick Gray, 94 Third Ave.; architect, C. B. Sheldon.

North Elliott Pl., e s, 125′ n Myrtle Ave., three-st'y brick store and tenement, tin roof; cost, $3,500; owner, Smith W. Tryon, North Oxford St.; architect, H. Van Nostez; builders, C. A. & S. B. Bartow and R. Tryon.

Franklin Ave., w s, 100′ n Greene Ave., two-st'y brownstone and brick front dwell., tin roof; cost, $5,500; owner and builder, Myron C. Rush, 329 Franklin Ave.; architect, G. P. Chappell; mason, C. King.

McDonough St., Nos. 384 *and* 386, s s, 170′ e Stuyvesant Ave., four-st'y brownstone and brick asylum building; cost, $20,000; owner, Hebrew Orphan Society, 380 and 382 McDonough St.; architect, T. Engelhardt; builders, U. Maurer and C. L. Johnson.

Alteration.—*State St., No.* 75, raised half-st'y, gravel roof, and four-st'y brick extension, new foundations built; cost, $9,000; owner, Mrs. C. Gilmore; builders, H. L. & W. A. Southard.

East Seventy-fifth St., Nos. 20 *and* 22, one-st'y brick extension; cost, $5,000; owner, Wm. S. Maddock, 313 East One Hundred and Twenty-third St.; superintendents, Maclay & Davies.

Seventieth St., s s, 20′ w Madison Ave., four-st'y brick extension; cost, $10,000; owner, Stephen Barker, exr., 24 East Seventieth St.; architect, G. A. Schellenger.

Front St., n w cor. Wall St., internal alterations; cost, $5,000; owner, Ellen S. Auchmuty and others, University Pl., cor. Twelfth St.; architect, H. S. Hardenburgh; builder, J. L. Hamilton.

Chicago.

Apartment-Houses.—C. P. Thomas, architect, has plans completed for a four-st'y apartment-house, 31′ x 82′, for Theodore G. Springer, to be built cor. of Division St. and Lasalle Ave., to cost $18,000.

John Otter, architect, has the following apartment-houses:—

An apartment-building on Whitney St., for J. F. Wash, to cost $16,000.

An apartment-building on Sedgwick St., for C. A. Helander, to cost $9,000.

An apartment-house at No. 15 Oak St., for F. Danielson, to cost $7,500.

An apartment-house on West Ohio St., for A. Mangson; cost, $7,000.

A pressed-brick tenement building, four stories and basement, on n e cor. of Sedgwick and Oak Sts., for H. Rumsfeld; cost, $20,000.

Houses.—John Otter, architect, has plans for Mr. O. Vider's dwelling, to be built cor. Garfield Ave. and Sedgwick St., to cost $9,000.

Mr. L. G. Haliberg, architect, is building an octagon addition to Prof. Swing's house, at No. 401 Superior St.

Flats.—John Otter has on hand 3 four-st'y flats for Blomgren Bros. & C. P. Holmberg, pressed-brick and stone finish; to cost $40,000.

The same architect has plans for three-st'y and basement flats on Lasalle Ave., of Columbia and Berlin stone, for D. Donegan, to cost $30,000.

Stores.—John Otter has 2 three-st'y stores and dwells. on s e cor. of Ontario and Franklin Sts., for J. A. Lind, to cost $20,000.

C. P. Thomas, architect, has plans for stores on North Clark St., for Mr. F. F. Spencer, of pressed-brick and stone finish; cost, $20,000.

Five stores and flats at the s w cor. of State and Thirty-third Sts., for Herbert Cossard, of stone and pressed-brick; cost, $30,000.

Building Permits.—J. Busam, two-st'y brick dwell. and barn, 20′ x 50′, No. 513 Sedgwick St.; cost, $4,800.

R. Hitt, three-st'y brick store and flats, 25′ x 80′, 254 Ogden Ave.; cost, $12,000.

John Rick, two-st'y brick dwell., 22′ x 60′, 14 Evans St.; cost, $3,000.

The Johnston Estate, two-st'y brick store, 24′ x 60′, 53 North State St.; cost, $2,500.

Carl Frenz, two-st'y basement brick flats, 22′ x 56′, 738 Girard St.; cost, $2,500.

Blomgren Bros. & Holenberg, 4 three-st'y brick flats, 69′ x 100′, 456–462 Hurlbert St.; cost, $35,000.

Edward Burk, two-st'y brick store and dwell., 22′ x 40′, 500 Twenty-sixth St.; cost, $3,000.

S. Prybyl, 2 two-st'y brick dwells., 48′ x 55′, Western St., cor. Armatage St.; cost, $4,500.

E. Schlick, four-st'y basement brick store and flats, 25′ x 94′, 437 North Clark St.; cost, $12,000.

John Koula, two-st'y brick dwell., 20′ x 32′, 482 Union St.; cost, $2,500.

T. C. McKay, two-st'y basement attic brick dwell., 22′ x 36′, 526 Ashland Ave.; cost, $3,000.

Mary E. Sands, two-st'y brick dwell., 50′ x 64′, 292 Hermitage Ave.; cost, $9,000.

Mathews & Cornwall, 2 three-st'y brick dwells., 50′ x 67′, 648–650 Monroe St.; cost, $15,000.

John Rode, two-st'y basement and attic brick dwell., 20′ x 67′, 286 Hastings St.; cost, $5,200.

E. B. Wheelock, three-st'y brick flats, 25′ x 76′, 514 Jackson St.; cost, $7,000.

Cincinnati.

Building Permits.—D. H. Baldwin & Co., four-st'y brick store, Fifth St. bet. Wood and Stone Sts.; cost, $7,000.

C. H. Weiss, two-st'y brick building, 660 Sycamore St.; cost, $3,500.

Wm. Onitges, four-st'y brick building, 512 Race St.; cost, $7,000.

Peter Scherer, three-st'y brick building, s w cor. Liberty St. and Central Ave.; cost, $10,000.

Mrs. F. Darusmont, four-st'y brick building, 917 Vine St.; cost, $10,000.

A. J. Mullane, two-st'y brick building, cor. Central Ave. and Third St.; cost, $4,000.

Eight permits for repairs.

Total permits to date, 319.

Total cost to date, $1,163,000.

Milwaukee, Wis.

Building Permits.—The following building permits have been granted by the Board of Public Works:—

H. Goese & Bro., brick veneered dwell., on Van Buren, between Wisconsin and Michigan Sts., to cost $2,800.

Fred Kropf, brick dwell., on Third St., in the Second Ward, for Mr. Blown, to cost $2,800.

Ferye & Kuppen, double brick house on Grand Ave., near Eighth St., in the Fourth Ward, for E. W. Meachan, to cost $12,000.

New York.

Apartment-House.—At Nos. 30 and 32 West Thirty-fifth St., a bachelors' apartment-house, 40′ x 100′, eight-st'y, brick and brownstone, is to be built from designs of Mr. Jas. Brown Lord, at a probable cost of about $200,000.

Houses.—Messrs. Hubert Pirrsson & Co. have drawn plans for Mr. Morril for six houses, to be built at Mott Ave., cor. One Hundred and Fiftieth St. They will be of brick, two stories and French roof, and will cost about $7,000 each.

For the Hon. Chas. H. Truax, a brick and terra-cotta house is to be built, from designs of Mr. Jas. S. Farnsworth, to cost $ 5,000. It is to be built on One Hundred and Twenty-fourth St., facing Mt. Morris Park.

Market-House.—Plans for Washington Market are being perfected by Mr. Douglas Smyth.

Telegraph-Building.—The competition for the Western Union Telegraph Company's building, Fifth Ave., cor. Twenty-third St., is, we hear, to be limited to three architects, who we understand are Messrs. H. J. Hardenbergh, E. E. Raht, and Bruce, Price & Freeman.

Tenement-House.—An improved tenement-house,